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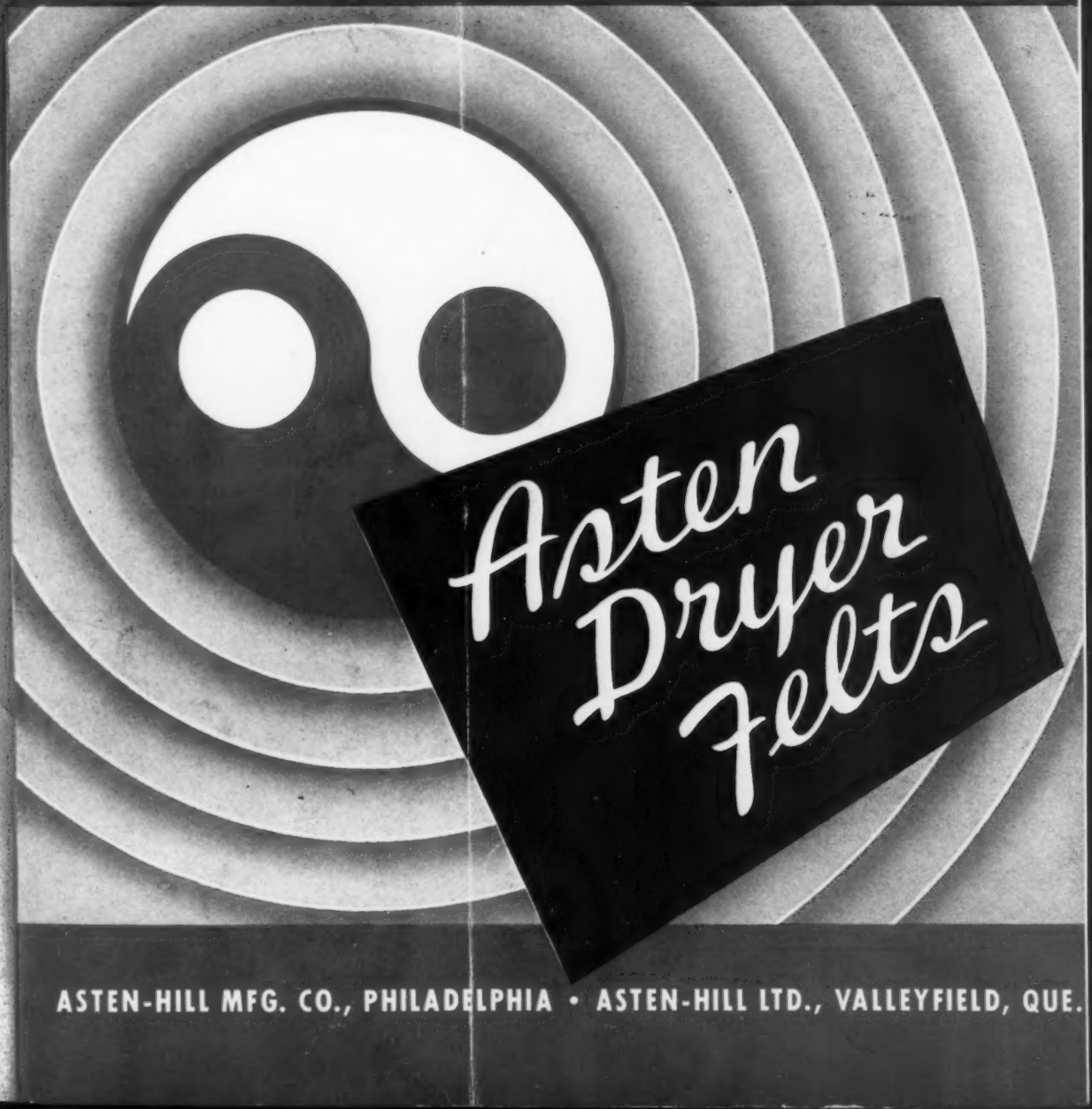
VOLUME 125, No. 16 OCTOBER 16, 1947



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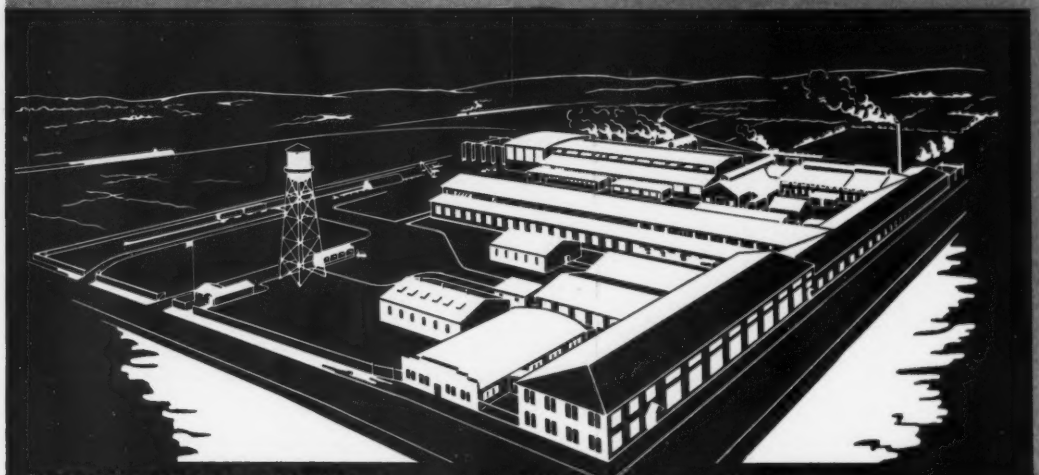

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W. L. COOK, *Editor* • E. P. NUTTALL, *Assistant Editor* • R. G. MACDONALD, *"TAPPI" Editor* • F. B. GROSSE, *Production Manager*

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CALENDAR OF COMING EVENTS

October 23-24, 1947—TAPPI Fibrous Agricultural Residues Meeting, Alton, Ill.

October 27-29, 1947—The National Paper Trade Association of the U. S., Inc., Semi-annual Convention, Hotel Sherman, Chicago.

November 3-5, 1947—TAPPI Second Engineering Conference, Philadelphia, Pa.

May 18-20, 1948—American Pulp and Paper Mill Superintendents Association, Annual Meeting, Roosevelt Hotel, New Orleans, La.

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Paper TRADE JOURNAL

VOL. 125, NO. 16 REG. U.S. PAT. OFF. OCTOBER 16, 1947

Canada Tells Facts To Brown's Party

TORONTO, Ont.—The select committee of the United States House of Representatives studying the problem of getting additional allotments of Canadian newsprint for the smaller publishers was provided with plenty of information by Canadian manufacturers and government officials while in Toronto last week. The congressional committee, headed by Congressman Clarence J. Brown of Ohio, was accompanied by a large group of United States publishers.

Most of the first day's deliberations had to do with the main question of how to secure an additional allotment of from 10,000 to 15,000 tons, which, it was explained would "take off the great pressure on Congress for reimposition of controls." A number of sessions of the committee were held and visitors finally entertained at a banquet by Premier George A. Drew of Ontario.

Criticism of the anti-trust division of his own government for subpoenaing Canadian newsprint companies to show their records was expressed by Chairman Brown. "We have enough trouble in the United States without it being necessary for any public official to come to Canada to look for work," Mr. Brown said at the banquet. "If we clear up our own mess and forget any possible wrongdoings by Canadians we will be busy for a long time," he added.

Premier Drew described issuance of the subpoenas as "extremely ill-advised, and to say the least, not in keeping with that magnificent spirit of international good-will which has been an example to the whole world for so many years."

Continuing, Premier Drew added, "While there is nothing to hide, I must say that I would be extremely disappointed if any Canadian company complied with a subpoena to produce its records in the United States. I would expect any American to be equally disappointed if any company in that country complied with similar demands should they ever be made in connection with proceedings instituted in this country under our own anti-combine laws against companies carrying on business in the United States."

Premier Drew said he had been approached "directly" by representatives of "many" foreign powers with offers to pay much more than the current

(Continued on page 14)

TAPPI and APPMSA Groups Hold Twin Meetings in Asheville

Normal Wallpaper Market Gone Yates Reports

WILMINGTON, Del.—Speaking to the shareholders at the annual meeting, William H. Yates, president of United Wallpaper, Inc., stated that current business of the company "is no too good," that the company is operating on a 2-year line though the shortage of raw stock a year ago which prompted it is gone today. Further, he said that the normal wallpaper market for rental real estate is gone, that the lack of movement of people has cut wallpaper sales, and the cold rainy spring kept decorating low.

Dunnington Elected to Great Northern Board

BOSTON—William O. McKay, president of the Great Northern Paper Company, has made known the election to the board of directors of his company of Walter C. Dunnington, senior partner of Dunnington, Bartholow & Miller, and a director of several industrial concerns.

RAYMOND F. BENNETT
President of the Superintendents Association and master of ceremonies at the TAPPI Superintendents Convention in Asheville.

ASHEVILLE, N. C.—More than five hundred pulp and paper mill technicians, executives and engineering specialists gathered here at the foot of the Smoky Mountain section for a busy three-day convention last week. The occasion was a double—some called it quadruple—meeting that involved two special sections of the Technical Association of the Pulp and Paper Indnstry and two divisions—the Southern and the Southeastern—of the American Pulp and Paper Mill Superintendents Association. Professional meetings started early in Thursday morning in the Municipal Auditorium with TAPPI in the main hall and the superintendents filling a lecture space in the basement. They were interrupted Friday for mass visits to the Champion and Ecusta mills in nearby towns, and resumed again on Saturday. The TAPPI sessions filled the entire last day of the meeting; the Superintendents took an afternoon off for golf. Both groups got together again for the banquet in the evening, with nearly five hundred remaining over for this climax to the program.

As the meeting drew to a close on Saturday night general satisfaction was expressed at the whole plan, and enthusiasm for the capable manner in which details had been executed was plainly evident. Reuben Robertson, president of the Champion Paper and Fibre Company, and president of the American Paper and Pulp Association was guest of honor and chief speaker of the evening. Briefly he pointed out that continuation of the present aid to Europe program must result in continued demand for goods of all kinds, and that this must be expected to act as an encouragement to continued high costs and high prices. He had been introduced to the audience by Harry H. Strauss, president of the Ecusta Paper Corporation, which shared with Champion the sponsorship of the entire meeting program. Mr. Robertson also was presented with an honorary membership in the Superintendents Association by Fred Boyce one of the trustees of the association.

Homer H. Latimer, Champion's director of paper manufacture, and former Superintendents president, in-

(Continued on page 18)

Fibreboard Products Puts Bland in Charge

SAN FRANCISCO — D. H. Patterson, Jr., president and general manager of Fibreboard Products, Inc., has resigned from the latter position and T. Noel Bland, vice-president, has been elected to take over the active management of the organization as vice-president and general manager. Patterson remains as president, director, and member of the Executive Committee.

Patterson has a record of more than 50 years in the paperboard business, of which 35 years have been spent on the Pacific Coast, with Fibreboard and a predecessor company. Bland has been associated with the same organizations for 26 years, the last ten as vice-president of Fibreboard.

The industrial empire of which Bland will take over active control is one of the three largest producers of paperboard cartons and shipping containers in the United States. With the completion of its San Joaquin division at East Antioch, California, Fibreboard will have seven board mills and nine converting plants on the Pacific Coast, strategically located from Canada to Mexico, a shipping container plant in Philadelphia, and a shipping container and carton plant in Baltimore, Maryland.

While the company has long conducted logging operations on the Olympic Peninsula in the Pacific Northwest, Fibreboard has recently acquired ownership of over 75,000 acres of timber lands in northern California between Lake Tahoe and Webber Lake. To facilitate the operation of these properties Fibreboard is completing seven miles of railway from Truckee to the old town site of Hobart Mills. This ghost town is being rebuilt and will be the operating base of this new timber area which extends through Nevada County and Sierra County in California and Washoe County in Nevada. Today for the first time in nearly two decades lights are again shining from the few remaining houses in Hobart Mills, but soon many other families will join the five which have already been located in these once dark homes. Within a year it is expected that Hobart Mills will again be a bustling town of several hundred population.

From the end of the railroad line at Hobart Mills Fibreboard is building over twenty miles of private first-class trucking road to the Webber Lake area. This road will be the main artery for transporting logs to the operating base. Prior to being closed down nearly two decades ago the town had been an active logging center for sixty years.

In addition to its paperboard activities Fibreboard has several wholly-owned subsidiaries. Largest of these is Glass Containers, Inc., which has operated a plant for the manufacture of glass bottles and food jars in Los Angeles since 1933 and this year completed construction of an additional plant on twenty acres of land adjoining Fibreboard at Antioch, California. The two glass plants have a combined factory area of thirteen acres of floor space and employ 625 workers with an annual payroll of two million dollars.

Canadian Ass'n Names Pepler and Koroleff

MONTREAL — W. A. E. Pepler has been named manager of the Woodlands Section of the Canadian Pulp and Paper Association, and A. Koroleff as director of Woodlands Research of the Pulp and Paper Research Institute of Canada.

Mr. Koroleff has been forester-secretary and manager of the Association's Woodlands Section for the past twenty years. Mr. Pepler is presently manager of the Quebec Forest Industries Association and is also secretary-manager of the industry's Pulpwood Committee.

"Mr. Koroleff's appointment," says the Association's statement, "emphasizes the increasing importance of forest research to the pulp and paper industry which is now engaged in implementing its declared forest policy of sustained yield."

"Mr. Pepler brings to the management of the Woodlands Section a broad experience in forestry, in forest legislation, in woods labor, and in pulpwood supply," the statement continued.

He is a member of the Canadian Society of Forest Engineers, the Quebec Society of Forest Engineers, the Quebec Forestry Association and the Garrison Club.

McGillan is Made Honorary Fire Chief

KIMBERLY, Wis.—George P. McGillan, chief fire inspector of all Kimberly-Clark mills and retired chief of police at Appleton, Wis., was made honorary chief of the fire department of the Kimberly mill at the final program given during Fire Prevention week. This program was given the evening of October 9. During a program the preceding evening, both at the clubhouse, J. T. Doerfler, mill manager, was made honorary assistant fire chief. He was unable to be present at the October 9 program.

McGillan and Doerfler received certificates signed by Cola Parker, K-C president, and J. Leslie Sensenbrenner, assistant secretary and treasurer of the corporation, and gold badges.

Sullivan Talks Before Rotary

HUDSON FALLS, N. Y.—Sylvester Sullivan, chief engineer of the Union Bag & Paper Co., described the various processes used in the manufacture of paper at a recent luncheon of the local Rotary Club held in this city.

Cash Will Supervise Brown's Kraft Mill

BERLIN, N. H.—C. R. P. Cash, since 1945 superintendent of Brown Corporation's mill at La Tuque, P. Q., soon will assume new duties in the pulp division of Brown Company at Berlin. Lamar M. Murray, who has had a wide experience in the kraft pulp field, has joined the pulp division. Mr. Cash will take charge of starting up the new kraft mill, following which he will assume the duties of general superintendent of pulp production for Brown Company.

Mr. Cash first joined Brown Corporation in 1915, working in the laboratory. Later he was transferred to the forestry department, but was recalled to take charge of the laboratory in 1917. In 1921 he entered Tri-State College, Angola, Indiana, graduating as a chemical engineer.

Following graduation he went to the state of Washington to work first for the Crown Willamette Paper Company and from 1926 to 1930 for the Cascade Paper Company as pulp mill superintendent. Later he acted in a supervisory capacity with St. Regis Kraft and chief chemist for the St. Helens Pulp and Paper Company. From 1935 to 1945, Mr. Cash was assistant superintendent in the kraft and soda mills of the Champion Paper and Fibre Company at Pasadena, Texas. In 1945 he was appointed superintendent of the Brown Corporation mill at La Tuque.

Mr. Murray recently spent considerable time in Mexico, where he supervised the completion of and set in operation a 120-ton kraft mill of Compania Industrial De Atenquique. A Louisiana State University graduate, Mr. Murray served as assistant kraft mill superintendent following his graduation from college. He had further kraft experience with the North Carolina Pulp Company, at Plymouth, N. C., at the Hollingsworth and Whitney mill, Mobile, Ala., and at the Florida Pulp and Paper Company, Pensacola, Fla., where he was assistant pulp mill superintendent.

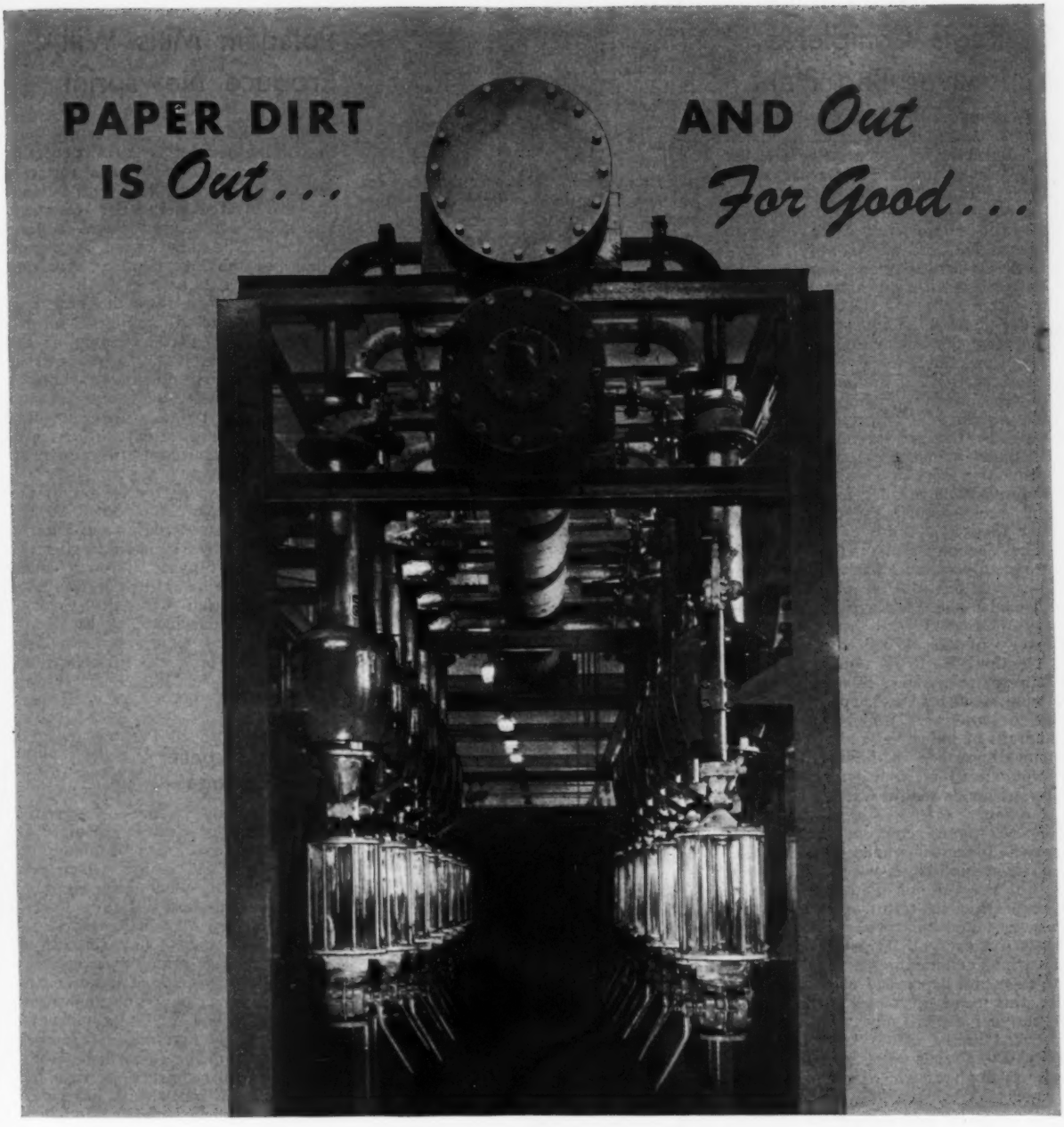
Weihenmayer Joins Franklin Research

PHILADELPHIA—Edwin A. Weihenmayer, Jr. has joined Franklin Research Company, in the capacity of Manager of their paper division.

He will bring with him a great deal of knowledge in the manufacture of paper as well as its use, and a wide sales experience.

Mr. Weihenmayer has spent his entire business life with the Jessup & Moore Paper Company. Although he is now with Franklin Research Company, his association with Jessup & Moore will continue.

Mr. Weihenmayer is very well known and popular in the paper trade, and has the best wishes of his many good friends in his new connection.



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St. Regis Completes Vancouver Bag Plant

VANCOUVER, B. C.—Completion of a new $450,000 multiwall paper bag plant at Vancouver by the St. Regis Paper Company (Canada) Ltd., marks another milestone in the organization's long-range plan for plant expansion and modernization, according to Thomas H. Cosford, vice-president.

Mr. Cosford pointed out that the new plant, with an annual capacity three times that of the former Vancouver plant, was built with the long-term view of serving industry on the West Coast and, in addition, meeting the increased demand for paper bags for the Canadian export trade.

"Construction of the plant was necessitated by the growing demand from Canadian industries for St. Regis multiwall paper bags to package the Dominion's chemicals, fertilizers, cement, rock products, sugar, flour and other foods," he said.

The Vancouver plant, together with the recently-expanded facilities at Dryden, Ontario and Three Rivers, Que., will enable the St. Regis Paper Company (Canada) Ltd. to develop a capacity of 225,000,000 bags annually.

The three St. Regis plants in Canada manufacture multiwall paper bags in a wide range of sizes, types of plies, and construction. Used for packaging hundreds of industrial and agricultural commodities, they are finding increased acceptance in all industries for shipment of goods within Canada and also for export.

These rugged containers each day carry millions of pounds of goods. If the 225-million-bag-a-year capacity of the three St. Regis plants in Canada is expressed in terms of weight of contents, then multiwalls from these plants can carry 18,000,000,000 pounds of various commodities a year. Taking the 80-pound paper bag as an average size, this means that each working day of the year enough paper bags will be produced in the three plants to carry 50,000,000 pounds of Canadian products throughout the Dominion and overseas.

In reviewing the company's expansion, Mr. Cosford said: "Since Canada is a nation in which the development and use of forest products is of tremendous importance to the whole economy, the inherent advantages and economies of multiwall paper bags will contribute directly to the diversification and stability of the Dominion's paper industry."

The Vancouver plant, embodying the latest features in modern industrial design, has 60,000 square feet of floor space and is equipped with two tubers and auxiliary equipment, one Schmutz 72-inch four-color press, one dipping tank, one 72-inch slitter, and rewind unit.

The new plant also has a modern substation equipped with an enclosed type switchboard. Fluorescent lighting is used throughout the plant. Traffic facilities for loading four railroad cars at car floor level are provided. The Canadian Pacific Railway and the British Columbia Electric Company will service the plant.

Every precaution has been taken in the new plant to contribute to worker welfare, efficiency and safety. All painting, done to the specifications of industrial engineers, incorporates the best practice of modern color dynamics. Facilities include a cafeteria and lunchroom, first aid and rest rooms, modern washrooms and locker rooms.

"The new Vancouver plant, in conjunction with increased facilities at Dryden and Three Rivers, will enable the St. Regis Paper Company (Canada) Ltd. to improve its service to customers, to broaden the range of types of paper bags manufactured, and at the same time meet the increased demand for bags for both domestic and export shipments," Mr. Cosford said.

Owens-Illinois Acquires Grand Rapids Paper Box

GRAND RAPIDS, Mich. — Acquisition of the assets and business of the Grand Rapids Paper Box Company has been effected by the American Coating Mills Division of Owens-Illinois Glass Company. R. L. Snideman, vice-president of Owens-Illinois and general manager of the American Coating Mills Division, which for more than thirty years has supplied the major part of the Grand Rapids company's paperboard requirements, said facilities of the company would be expanded considerably.

Owens-Illinois will take over the operation of the Grand Rapids firm November 1. It specializes in the manufacture of folding cartons and setup boxes for the drug industry.

Ozalid Shows Visitors Its New Plant

BINGHAMTON, N. Y.—The new $2 million plant of Ozalid was shown to 300 Ozalid representatives from all over the world who attended the Ozalid International Conference at the West End Avenue Armory and in the new plant.

Production facilities of the new plant are so highly mechanized that the company will be able to turn out 24 times more coated paper than it does at its old plant.

Ozalid employs about 300 people in its paper coating department. Production in the new plant officially will start in about two weeks.

NEPCO Gets Option on Nekoosa City Land

NEKOOSA, Wis.—The Nekoosa common council has adopted a resolution granting an option for ten years to the Nekoosa-Edwards Paper Company, for purchase of land owned by the city. The land would be used for construction of an industrial plant. The purchase price was set at $10,600.

Potsdam Mills Will Produce Newsprint

POTSDAM, N. Y.—The Potsdam Paper Mills Inc., has recently purchased the former Unity Paper mills in Depot street which was formerly owned and operated here by the Reading Corrugated Container company. The mills were closed down on June 12, 1947. The new owner is a subsidiary of the Fox Feature Synidcate of New York City.

Although officials of the new corporation preferred making a formal announcement of the opening of the new industry later, it was learned that several improvements and expansions are planned and new equipment and machinery installed. Also it was learned that the first carload of material for the manufacture of newsprint has arrived.

The mill was originally built by the late A. L. Lockwood about 1900 for the manufacture of wall paper. Later it was operated by stockholders for the manufacture of paper and was called the United Paper Mills. It was also owned for a time by Max Sverdlow before it was purchased by the Reading Corrugated Container company. The mill has been closed at various times since it was built. The last concern employed approximately 35 persons.

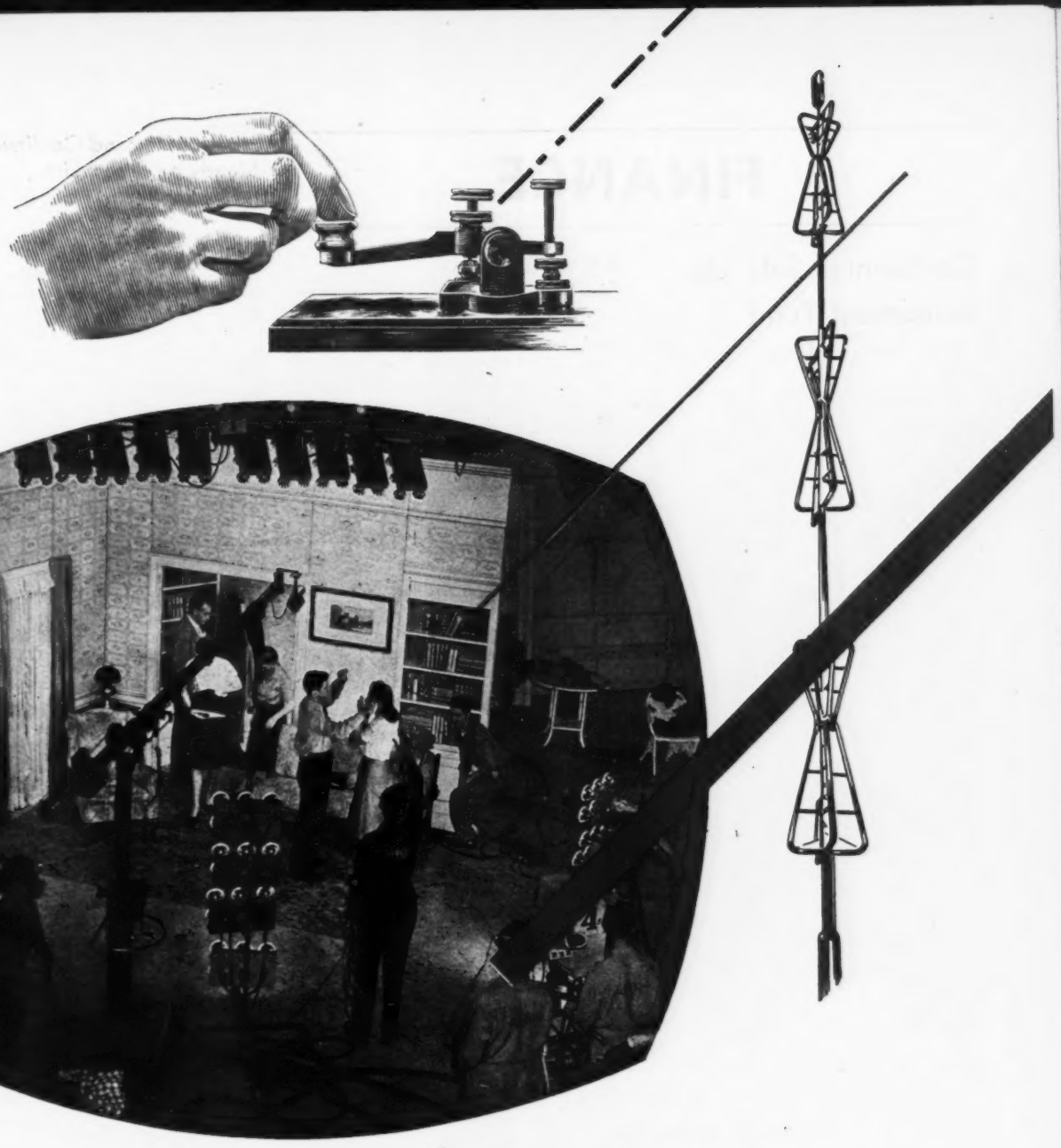
Seek Fog Dispeller At Ticonderoga

TICONDEROGA, N. Y. — Corrective steps are under way by officials of the International Paper Company to eliminate the heavy fog which has settled over the community intermittently since the firm installed its recovery plant last March. An investigation has been under way relative to learning the best brand of equipment which can be purchased in order to satisfactorily remedy an unpleasant condition that has brought complaints. It is understood that adequate apparatus to eliminate the fog will be costly and that it will require some time for installation. However, it has been definitely established that methods will be used to correct the trouble.

The village has at frequent intervals been covered with the low-hanging fog since the installation of the recovery plant, a seven-story building which houses apparatus to reclaim spent liquor from the pulp mill. Decision to take corrective measures followed conferences of mill officials with town, village and county authorities.

Paper Corp. Instals Five Jones Refiners

CHEBOYGAN, Mich. — Five High Speed Refiners built by E. D. Jones & Sons Company have recently been installed at the Paper Corporation of America. These units are replacing two large jordans at a power saving of about 50 per cent.



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FINANCE

Continental Sets Up Retirement Fund

NEW YORK—A Union contract for retirement pay which the workers themselves create, with no ceiling to limit it, was signed this week between the United Paper Workers of America, Local 299, CIO, and the Continental Paper Company of Ridgefield Park, N. J.

It supplements a recent contract which contained the first share-of-production plan ever endorsed in this country by union labor.

Purpose of the new agreement, underwritten by the Connecticut General Life Insurance Company of Hartford, Conn., and John C. Conklin, Inc., of Hackensack, N. J., is to establish retirement pay for hourly employes of the Continental Paper Company, one of the nation's largest manufacturers of paper board.

Current performance under the plan provides an average of $475 a year toward retirement pay for each employe. Thus, a worker now 35 years of age would receive approximately $250 a month for life, at age 65, including Social Security. This pay is provided through the combined efforts of all hourly employes under the share-of-production plan. Other features, include a $3000 benefit payment for the family of any employe who dies; also full retirement pay based on accumulated service for those who leave the company, collectable after age 65.

B-S-W Ready to Start Operations

VANCOUVER, B. C. — Operations are ready to start at the new Alberni, B.C., pulp mill of Bloedel, Stewart & Welch Ltd. For the initial operations, power will come from the Puntledge River plant of Canadian collieries.

British Columbia Power Commission can not get its power supply started until December or later. In the meantime, however, the pole line has been erected and wires are now being installed.

Puntledge River power will, therefore, be carried temporarily over the new line from Courtenay to Alberni. By this method the new mill can get going in mid-October. The Puntledge power has heretofore been 25-cycle, but new machines are being put in to transform this to 60-cycle to conform with the British Columbia Power Commission wiring arrangements and the requirements of the Alberni mill.

National Gypsum Sales Seen 40 Per Cent Ahead

BUFFALO — National Gypsum's sales "are running at a record rate and are about 40 percent ahead of a year ago," according to President Melvin H. Baker. Sales for 1947 are estimated at about $50 million against $38,056,822 in 1946. The year's net profit is estimated at approximately $2.75 a share against $2.21 a share in 1946.

Hoosier Demand Continues Steady on Broad List

INDIANAPOLIS — Continued demand for practically all grades of paper featured the market here last week. Manufacturers and jobbers assert the general situation is more satisfactory than it was a year ago, largely because supply very gradually appears to more equal demand. Warehouse stocks are low, but there is some indication that inventories at the end of the year will be materially larger than they were last year-end. Naturally production costs have advanced and the jobbers say their costs also are higher than a year ago. Even with higher wages, some of the factories say the labor turnover still is large and employes are hard to find. A perusal of the classified ads in the daily papers shows this is true.

The bag demand is brisk at the present time. Cleaners and laundries were in the market last week. The former are having a particularly good business, what with schools opening and the change of season. Demand from the ice producing factories, which this summer turned more and more to paper ice containers, has fallen off somewhat, but still is good, since most of the paper-packaged ice is sold to taverns and others which have an all-year-round business.

Box factories are beginning to get orders for the Christmas trade which promise to be much larger than a year ago. They, however, are finding it somewhat difficult to get all the stock they need. However, stock supplies are rather higher than a year ago. All prices continued strong.

Local paper stock men say demand has continued good and they are expecting more, but collections have fallen down somewhat.

FINANCIAL RECORD OF THE WEEK

New York Stock Exchange

High, Low and Last for Week Ending October 11, 1947

STOCKS

	High	Low	Last
A. P. W.	5½	4⅝	5¼
Armstrong Cork Co	50⅞	49½	50⅝
Armstrong Cork Co., pf.	105¾	104¾	105
Celotex Corp.	30	28⅝	29¼
Celotex Corp., pf.	20⅝	20½	20⅝
Certain-Teed Products Corp.	19	18¼	18¼
Certain-Teed Products Corp. pf.	....	....	....
Champion Paper & Fibre Co.	24¾	23½	24½
Champion Paper & Fibre Co., pf.	107	105½	106½
Congoleum Nairn Co.	29¾	29¼	29¾
Container Corp. of America	44	42½	44
Container Corp. of America, pf.	101	99	99
Crown Zellerbach Co.	33⅞	32⅞	33⅜
Crown Zellerbach Co., pf. 4.20	105	104	104
Crown Zellerbach Co., 4 pf. 4	126	123½	126
Dixie Cup Co.	40	39¼	39¼
Dixie Cup Co., A	53½	52¼	52½
Flintkote Co.	38⅞	37½	38¼
Flintkote Co., pf.	....	....	....
Robert Gair	10¼	9¾	10
Robert Gair, pf.	19¾	19¾	19¾
International Paper Co.	56⅞	54	56
International Paper Co., pf.	102	102	102
Johns-Manville Corp.	44¼	43¼	44
Johns-Manville Corp., pf.	120½	119	119
Kimberly-Clark Corp.	24⅝	24	24
Kimberly-Clark Corp., pf.	109⅛	108	109½
Mac Andrews & Forbes	37	37	37
Mac Andrews & Forbes, pf.	140	140	140
Marathon Corp.	23¼	22½	22¾
Mead Corp.	22½	21¼	22⅛
Mead Corp., pf. 4¼	93¾	93¾	93¾
Mead Corp., pf. 2	48¼	48¼	48¼
National Container Corp.	14⅞	14	14⅞
Paraffine Companies, Inc.	73	73	73
Paraffine Companies, Inc., pf.	71¾	71¾	71¾
Rayonier, Inc.	28⅞	27⅜	28⅞
Rayonier, Inc., pf.	37¾	37	37¼
Ruberoid Co.	63	61	63
St. Regis Paper Co.	11½	10⅜	11½
St Regis Paper Co., pf.	93½	91½	92
Scott Paper Co.	47⅛	46½	46½
Scott Paper Co., pf.	101¾	100⅛	100⅛
Sutherland Paper Co.	41½	35¼	41½
Union Bag & Paper Corp.	36¾	35¼	36⅛
United Paperboard Co.	17¼	16¼	17⅛
U. S. Gypsum Co.	103¼	101½	102¾
U. S. Gypsum Co., pf.	184½	183½	183½
West Virginia Pulp & Paper Co.	46¼	42	46
West Virginia Pulp & Paper Co., pf.	....	....	....

BONDS

Celotex Corp., 3¼s '60	....	....	....
Certain-Teed Products Corp., 5¼s '53	....	....	....
Champion Paper & Fibre Co., 3s '65	....	....	....
Mead Corp., 3s '68	101¼	101¼	101¼

New York Curb Exchange

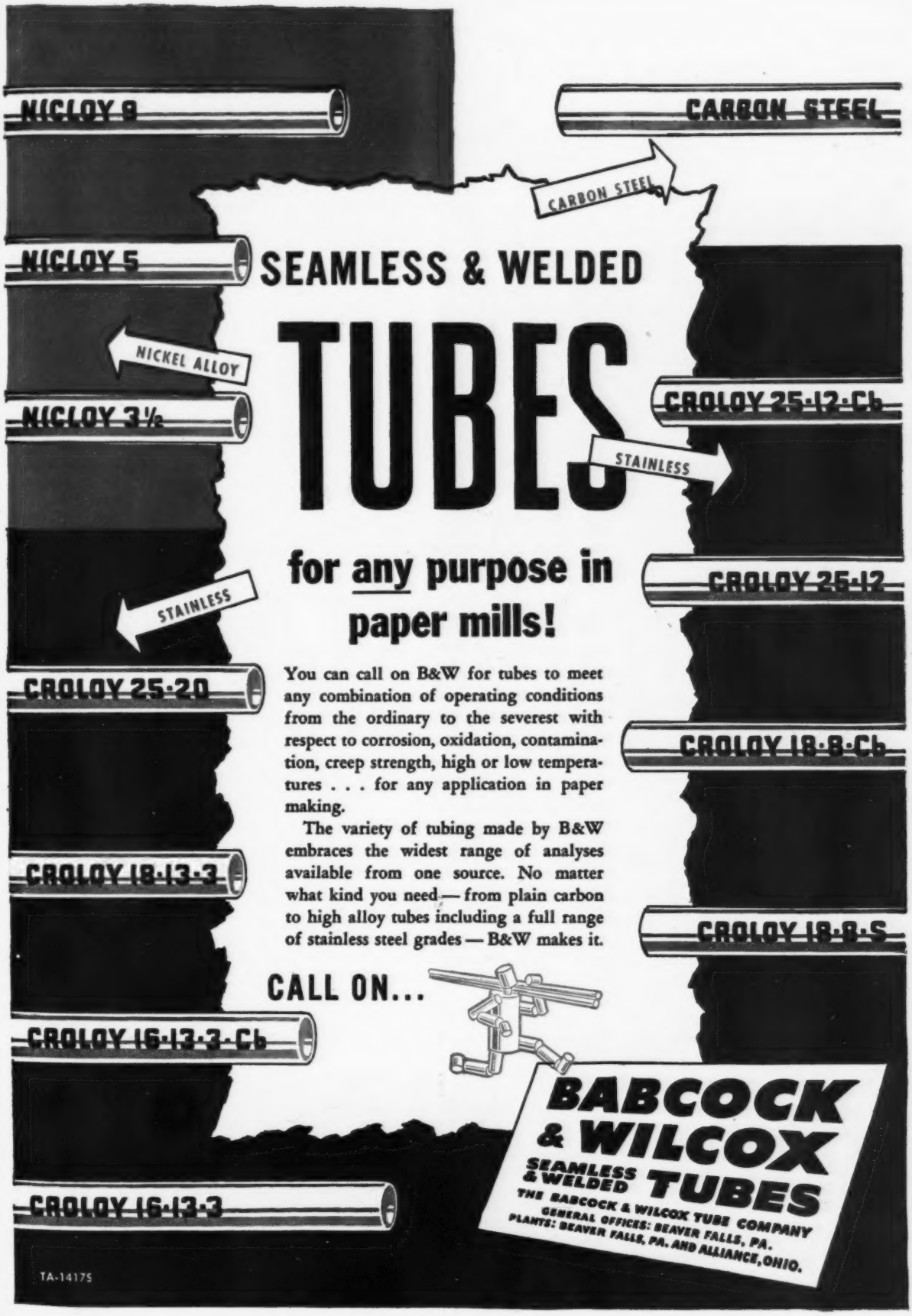
High, Low and Last for Week Ending October 11, 1947

STOCKS

	High	Low	Last
Great Northern Paper Co.	45	43¾	45
Taggart Corp.	10⅜	10⅜	10⅜

BONDS

American Writing Paper Co., 6s '61	102¼	102¼	102¼


NICLOY 8
CARBON STEEL
CARBON STEEL
NICLOY 5
SEAMLESS & WELDED
TUBES
NICKEL ALLOY
NICLOY 3½
CROLOY 25-12-Cb
STAINLESS
for any purpose in paper mills!
CROLOY 25-12
STAINLESS
CROLOY 25-20
You can call on B&W for tubes to meet any combination of operating conditions from the ordinary to the severest with respect to corrosion, oxidation, contamination, creep strength, high or low temperatures . . . for any application in paper making.
CROLOY 18-8-Cb
The variety of tubing made by B&W embraces the widest range of analyses available from one source. No matter what kind you need — from plain carbon to high alloy tubes including a full range of stainless steel grades — B&W makes it.
CROLOY 18-13-3
CROLOY 18-8-S
CALL ON...
CROLOY 16-13-3-Cb
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CROLOY 16-13-3
TA-14175

Canada Tells Facts To Brown's Party

(Continued from page 7)

New York price of $90 a ton for newsprint but had turned them down. The premier went on to explain the attitude of his government on the forest resources of Ontario. He said that Ontario, despite the current demands, would protect its forest resources.

"As trustees on behalf of the people we do not intend to permit an annual cut in excess of the actual crop growth, which assures perpetuity of our stands," he continued. "Since our mills are already operating at rated capacity, increased production can only come from the building of new mills or the introduction of new machinery. But even with increased capacity the Ontario government will not permit the over-all cutting to be extended to a point which imperils the future of our forests, no matter how great the demand may be."

Premier Drew blamed the shortage of newsprint in the United States on mills in that country which had converted from newsprint to the manufacture of finer papers "for a higher profit" and suggested that they could be reconverted back to newsprint which would completely relieve the situation. After explaining Canada's importance in newsprint production Premier Drew said that "by our laws every company is bound to produce the most detailed annual financial statements, disclosing every essential aspect of the financial affairs of the company and the cost of operation in relation to the newsprint produced." This information, the premier added, is available in the United States as well as in Canada and that the statistical information held by the department of lands and forests in Ontario is equally open to public disclosure. He said the department would be glad to furnish any information desired regarding cutting practices, allocation of forest areas and the procedure under which these industries operate.

Premier Drew went on to say that in 1926, Canada exported to the U. S. 1,658,000 tons of newsprint, while the mills of the U. S. produced 1,665,000 tons for domestic consumption. In 1936, Canada exported 2,435,000 tons while production in the U. S. for domestic use had dropped to 911,000 tons. Ten years later Canada's exports to the U. S. had risen to 3,355,000 tons, while the U. S., for its own use, was producing only 745,000 tons.

Canadian newsprint is selling in the U. S. at the lowest price to be found in any of the world's major markets, R. M. Fowler, president of the Canadian Newsprint Institute, told the conference at Tuesday's session. "It is selling at $90 a ton at New York compared to $141 a ton authorized by the British government for the output of English mills," said Mr. Fowler. "The price index of Canadian newsprint in the United States market is substantially lower than the general United States commodity price index issued by the United States Department of Labor. The newsprint price index is below the United States price indices of the two pulps from which newsprint is manufactured and is below the United States indices of all paper and pulp products as a whole."

"To what extent do you depend on American coal in the production of newsprint?" inquired Mr. Brown.

"About 80 percent," was the reply made by Douglas Ambridge, president of Abitibi Power and Paper Company, Ltd., "and the progress and possibility of coal strikes in the United States is watched anxiously here."

Shortage of freight cars is a great handicap to the industry both in Canada and the United States, Mr. Fowler and Mr. Brown agreed. "Twenty-five percent of our pulp comes in by freight cars and there is the problem of shipping out," said Mr. Brown. "Any interruption in the supply of box cars means reduction in production here."

The survey presented by the Newsprint Association of Canada went on to show that United States newsprint consumers are receiving 61 percent of the total available world supply at present. It was further shown that compared with the pre-war average of consumer demand in newsprint that the United States is receiving an increase of a million tons a year, while supply for the rest of the world shows a decrease of a million and a half tons a year. Canadian production in 1947 will show an increase of nearly 1,400,000 tons over the pre-war average. About 93 percent of this increase is going to United States consumers who are receiving 82 percent of Canadian output. In addition to this, newsprint supply for United States customers in 1947-48 is estimated as within 5 percent of maximum demand. The present world shortage of newsprint is estimated to be about one million tons.

The companies whose cases have so far come into court proceedings are the Canadian International Paper Company and International Paper Sales Company, subsidiaries of the American International Paper Company; Spruce Falls Company of Toronto, whose common stock is largely held across the border; and Abitibi Power and Paper Company of Iroquois Falls, Ont., and Toronto, with a sales company in the United States through George H. Mead and Company of Dayton, Ohio.

(It is understood that subpoenas have been directed also to Consolidated Paper Sales Company, Ltd., and Price Brothers Sales Company, Ltd., but there has been no official announcement in the cases of these companies.)

In the meantime neither the government of the United States or of Canada has made any clear-cut statement, although an informed Ottawa source said the Canadian government takes the stand that the United States has "no right" to take any action that will infringe on Canadian sovereignty.

The international paper companies' documents required include records of the companies' relations with 63 firms, agencies and groups, mostly Canadian and including the Canadian and provincial governments. The subpoenas also mention minutes of all meetings since 1940, details of price arrangements, rebates, refunds, freight cost agreements, lists of publishers paying "extra" for newsprint to a total of a half-dozen pages. The documents asked of these two companies alone fill 2,000 file drawers, and delve, the companies hold, into purely Canadian matters.

Canadian newsprint manufacturers listened with sympathy to the request for additional allotments to the smaller publishers in the United States. Some of the comment made by Canadian interests were as follows:

R. M. Fowler, president Newsprint Association of Canada — "It will require a lot of ingenuity by a lot of individuals to do the job, not any one solution."

R. C. Doane, vice-president Canadian International Paper Company— "We have the same problem here in Canada between the small and large publishers. The smaller publishers have had equal, if not better, treatment from us than the large publishers."

E. M. Little, president, Anglo-Canadian Pulp and Paper Mills, Ltd. — "By collaboration between the United States committee and the manufacturers we can solve the problem of the distress cases through finding 10,000 to 15,000 tons."

D. W. Ambridge, president, Abitibi Power & Paper Co. — "If you have some rotten apples in the barrel (of distributors) why not tell us who they are? We will scrutinize these distributors more carefully and we can put the heat on them. Let us know who they are." (Mr. Brown had previously pointed out that it was mainly a few distributors that were spoiling the whole situation by going into the "grey" market.)

A concrete example of a "black" rather than "grey" market was offered by Rev. John P. Randall, representing the Catholic Press Association of New York, who said a New Brunswick jobber had recently offered for sale 100 tons of newsprint at $400 a ton.

The prediction of a United States paper manufacturer that there will be an increase in the price of Canadian-made newsprint left members of the committee and publishers "stunned," according to Chairman Brown in addressing the final session. "We would accept any increase with deep regret as a mistake which will do injury to the newsprint industry and the publishing industry of the United States," Mr. Brown said.

Referring to the discussion where price increases were hinted, R. M. Fowler said: "No Canadian manufacturer could permit himself to be drawn into that conversation. It was only courtesy to our friends that kept us in this room while the discussion was

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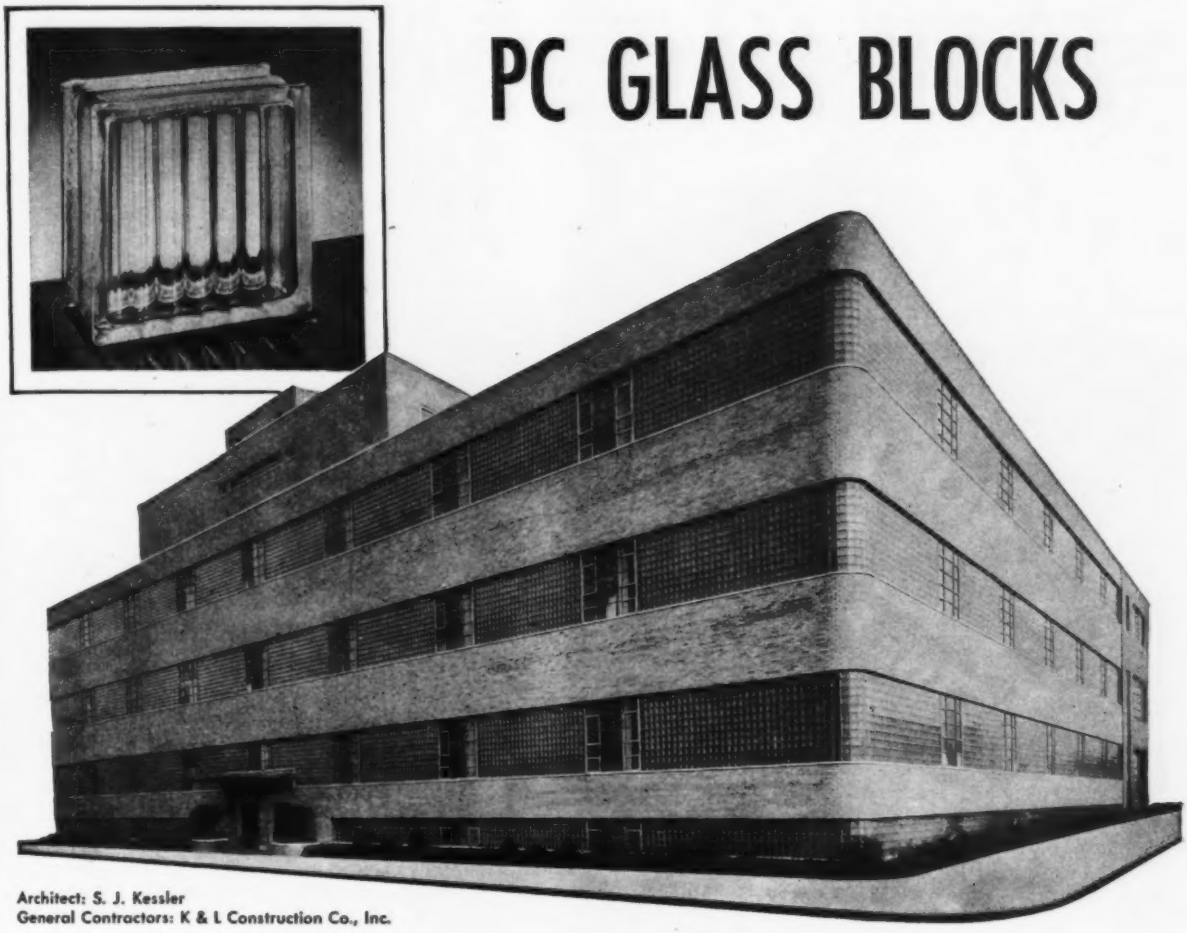

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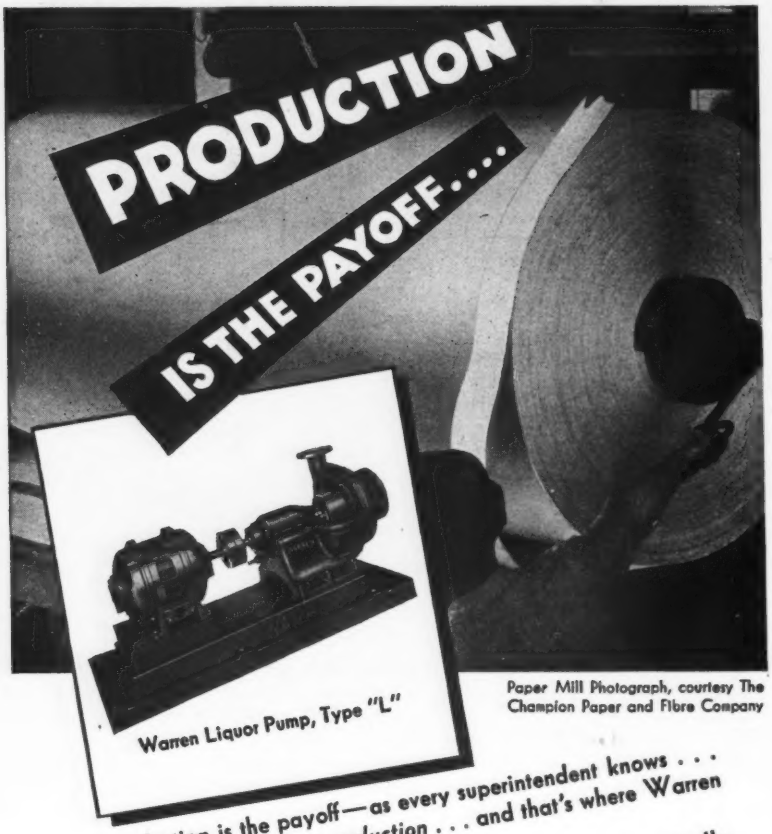
going on. Prices are exclusively for the individual action of individual producers."

Chairman Brown stated further that "A higher price for newsprint will quickly result in less consumption and instead of a profit will be a detriment. An increase will result in grave problems for publishers, especially the smaller publishers. Even the present price of newsprint is a grave problem and some of us are having trouble making ends meet. A price increase would speed up construction of competitive mills in the southern United States and apply further pressure for passage of legislation now before the United States Congress to subsidize a newsprint industry in Alaska and other United States Territories."

Congressman Brown was expected to make a special call upon Premier Drew at his offices in the provincial parliament buildings and said he "might" take up the question of a recent order-in-council by the Ontario government limiting export of pulpwood to the United States, but that the main purpose of his visit was to thank the premier for his hospitality to the visiting group. He said that the order-in-council was causing "some concern" in the United States. "I did not think it proper to refer to it at the conference," he added.

Concerning that Ontario should not allow an annual cut of pulpwood in excess of actual crop growth, James Conway, president, Hobert Paper Company, Green Bay, Wis., said Mr. Drew's action in eliminating the export of pulpwood from crown lands would work a "real hardship" on his company. Mr. Conway's mill falls into the category of the three-year elimination plan. "We certainly should have been granted a minimum of ten years," he said. Respecting Premier Drew's suggestion that United States fine paper mills convert to the production of newsprint, Mr. Conway said it "would gradually take more and more business away from Canada." Mr. Conway blamed the excessive needs of American advertising for the present paper shortage.

The premier's suggestion for a switch-over by American companies from fine papers to newsprint was termed a "contradiction" by George Hooper, executive of the Rhinelander Paper Company, Rhinelander, Wis. "There would be a tremendous cost involved in converting a plant like our own to newsprint production. A newsprint plant requires an entirely different set-up," said Mr. Hooper.



Paper Mill Photograph, courtesy The Champion Paper and Fibre Company

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Tissue Group Holds Annual Fall Meeting

NEW YORK—The annual fall meetings of The Tissue Association, Inc., were held at Whiteface Inn, Lake Placid, September 30 - October 3, inclusive.

The general industry meeting was held Thursday morning, October 2nd, with E. E. Grant, president of the Association and the Crystal Tissue Company of Middletown, Ohio, presiding. Mr. Grant outlined the growth of The Tissue Association since its organization in 1880, pointing out the opportunities for increased services and increased membership. Mr. Rex Vincent, technical consultant of the Bulkley Dunton organization, spoke on "The Problem of Market Pulp Supply" and E. W. Tinker, executive secretary of the American Paper and Pulp Association, reviewed general conditions in the pulp and paper industry. Ross A. Fife, executive secretary, made a comprehensive report of his recent extensive trip visiting tissue mills throughout the country.

The industry's golf tournament was held Thursday afternoon and was ably handled by hte golf committee composed of Louis A. Straubel, Sam Lopin and John McKirdy, Jr. A representative number of wives were present who were entertained at a card party during the golf tournament. Numerous prizes were awarded for both golf and bridge.

Fussell Leaves Walloomsac Mills

WALLOOMSAC, N. Y.—O. P. Fussell, superintendent of the Walloomsac Paper Mills, Inc., resigned this week from that connection.

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DRIER ROLLS AND DRYING MACHINERY

TAPPI and APPMSA Hold Twin Meetings

(Continued from page 7)

troduced as the first speaker of the evening W. F. Gillespie, president of TAPPI. Mr. Gillespie commented on the fine job that had been done by the local committee and the various groups in both associations that had organized the details of the meeting. He paid particularly emphatic attention to the development of TAPPI services, adding that he knows of no professional society that offers so much to its members.

He was followed on the program by Raymond F. Bennett, president of the Superintendents, who said, in part:

"Our gathering tonight brings to a close one of the most satisfactory meetings I have ever attended. It marks a milestone in this particular area because it is the first time that we have had a joint meeting here between the operating men and the technical men. It is very gratifying to see the congenial mingling between these two groups and demonstrates quite a contrast with the feeling that existed not so many years ago. At that time one group was referred to as 'rule of thumb paper makers' and the other group as 'damn chemists.'

Mutual Understanding Grows

"Since that time each group has gained a more thorough understanding of the usefulness of and need for the other. The operating man welcomes the technical man because he realizes that he can not keep his mill abreast of competition and consequently in business without the new developments that can come only from research. The technical man welcomes the operating man because he realizes that there still is and probably always will be a certain amount of art in paper making and no new development can be of any value until the operator actually puts it into practical operation.

"In a meeting such as this, technical men, the suppliers to the industry and we Superintendents have all had an opportunity to exchange views and experiences to our mutual benefit. I hope each and everyone in attendance can go back to his mill with a greater knowledge than when he came and that both he and his management will be thoroughly convinced that his trip was worthwhile.

"I wish to take this opportunity on behalf of the Superintendents Association to thank all of the many people who have worked so earnestly to make this meeting a success. I wish to thank especially the representatives of our associated industries and most especially Mr. Robertson, president of Champion, and Mr. Straus, president of Ecusta, for their generous help and wholehearted backing in making this meeting a success."

The meeting as such opened on Thursday morning with a brief joint session, which resolved itself into two separate groups after an invocation by a local pastor and a welcome by the mayor of Asheville.

The superintendents program opened with a formal list of papers. In the first of these H. C. Roane, assistant division manager of Bowser, Inc., urged that with higher speeds on paper machines the importance of correct lubrication has become increasingly pressing. He recommended that a lubrication engineer be consulted to reach a correct oil specification, that the flow of oil be maintained at a liberal rate, that moisture be kept away from machinery, monthly inspections be adopted for all bearing surfaces, and that adequate cooling controls be provided. He was followed by Charles Spalding of the Beloit Iron Works who used lantern slides to show how paper machinery has been refined and made safer in its design over the past few years. G. H. Young, vice-president of the Midwest-Fulton Machine Company, in an analysis of drying problems showed that it costs 10 per cent more to dry a sheet that comes from the machine two per cent wetter. He argued that drying costs can be reduced through proper coordination of three factors—wetness, steam pressure in the cylinders, and the closeness of the sheet to the dryer.

The afternoon meeting of the superintendents was given over to a symposium on stock preparation. It was led by R. F. Vokes of Dilts as moderator, with a panel consisting of Tony Agronin of Shartle Brothers, Douglas G. Sutherland, Dwight Jones and G. A. Hermann. The discussion brought out not only some highly specific local problems in southern mills, but some sharply defined differences of opinion and method among the panel members.

Two papers were on the superintendents Saturday morning program. In the first of these Frank S. McCall of Union Bag and Paper detailed some of the problems involved in clean-up on machines with particular reference to slime removal. After showing that eternal vigilance is the price of cleanliness he indicated that the field is still open for more study. The meeting closed with an analysis of a mill recreation program, its value and its extent, as developed in the Ecusta mill. It was delivered by John Eversman, who had supervised the entertainment on the evening before.

TAPPI's Double-Barrelled Program

TAPPI's share of the program, itself a double-barreled meeting, opened with a series of papers on various chemical products and by-products. The first of these, on the Thursday morning program, was a study of butyric acid fermentation of sulphite waste liquor by Hilda S. Daniels and J. L. McCarthy of the University of Washington. It reported preliminary investigations and comparisons of batch and continuous fermentation of waste sulphite liquor with reports on amounts recovered and time intervals required.

The separation of lignin sulphonic acids from the same liquor was the subject of another paper from the same university, with McCarthy as one of the authors; N. K. Heister and H. K. Benson shared in the investigation. A procedure was described by means of which calcium lignin sulphonates can be prepared in high purity and substantial yield by direct dialysis, and preliminary values for specific gravity viscosity were recorded.

Jennings Talks on Tall Oil

W. H. Jennings, manager of the Chemical Division of the Camp Manufacturing Company, reported that a review of the published works on the analysis of tall oil reveals large variations in the composition of this material. In an attempt to explain some of these variations a preliminary program was set up in which 177 samples of skimmings were obtained from several kraft pulp mills throughout the South and these samples analyzed for rosin acids, fatty acids, unsaponifiable matter, and acid number.

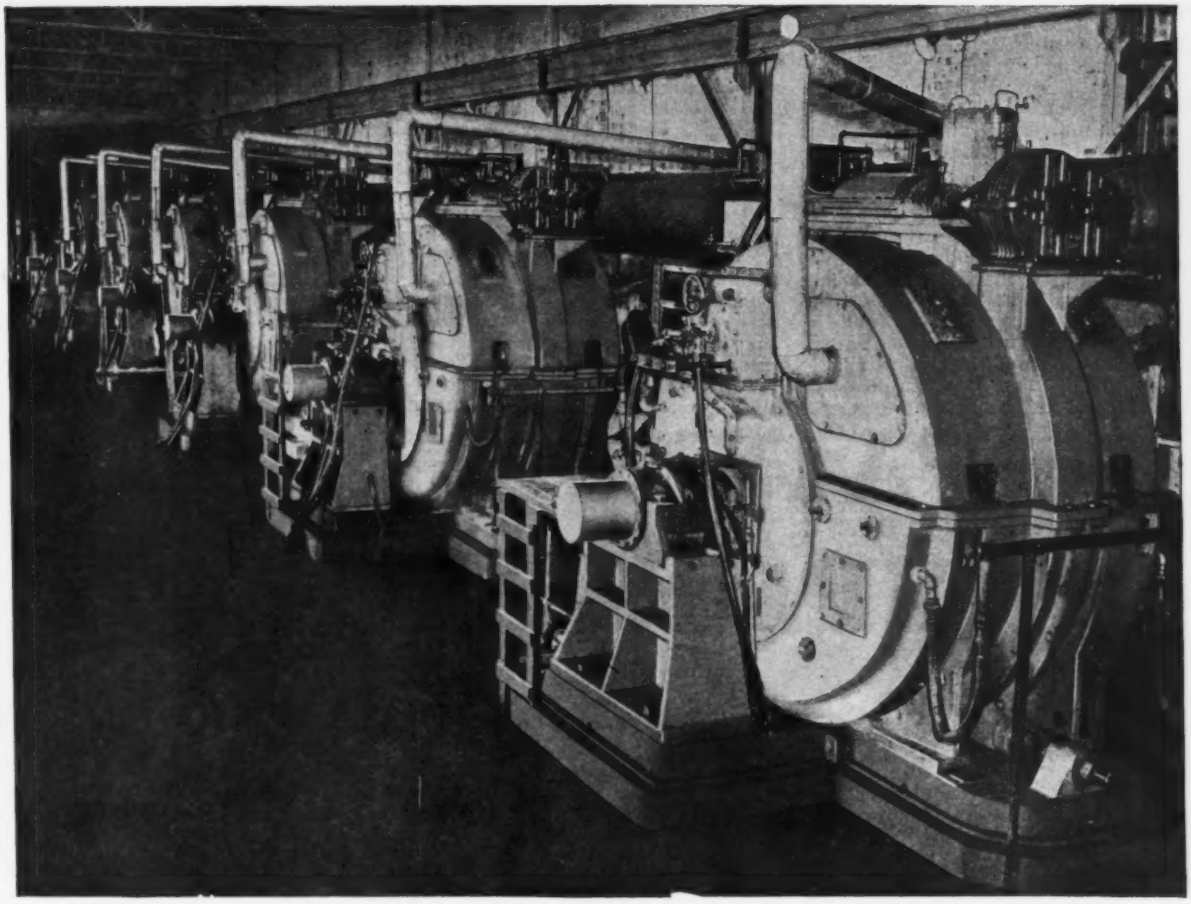
It was found that the composition of tall oil varied with geographical location but that seasonal variations had no definite effect. Tall oil obtained from South Carolina and Georgia contained a slightly higher percentage of rosin acids and unsaponifiable matter than that obtained from Virginia and North Carolina.

The composition of the fatty acid fraction remained fairly constant regardless of geographical location.

The morning session closed with a progress report and discussion of procedure under which TAPPI and the American Society for Testing Materials might develop tests and standards of analysis for tall oils.

The afternoon session opened with a short paper by John G. Lewis of the technical department of Rayonier, Inc., at Fernandina on the recovery of crude para cymene at that plant. From this the meeting proceeded to a study of chemical uses of sulphate turpentine. It was shown that the production of this has been increased considerably during the past few years; in 1945 its production ranked with that of wood turpentine and was about half that of gum turpentine. There is evidence of its increasing use in chemical industries and of decreased use in paint and varnish. It is believed that there is sufficient outlet in the chemical field to cover the entire production. Its composition with only a few chemical compounds which can be separated out readily to a high degree of purity suggests its utilization in chemical manufacture. The session closed with a resume by H. K. Benson of some developments in the by-products field in the northern Pacific Coast area by major plants and mills of that section.

The results of pilot plant tests of a multiclone unit for reducing the dust losses in stack gases from a lime kiln were discussed in a paper by T. T. Collins, Jr., on Saturday morning. It was indicated from this operation that possibly 70 percent of the lime dust might be recovered from a full scale



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unit. Where it is not desirable to cool the kiln gases the unit might still be expected to reduce the lime dust around the pulp mill.

H. W. Gehm and W. A. Moggio next presented a study by the National Council for Stream Improvement on methods of determining the oxygen demand of kraft mill wastes. Preliminary to a comprehensive study on the purification of kraft mill wastes by microbial oxidation, it was necessary to determine the modification of the biochemical oxygen demand technique most applicable to these wastes. Experience with various modifications at a number of mills revealed serious variations in results. This is understandable because certain elements necessary for high oxidation rates are not present in abundance in kraft waste and some constituents, if present in sufficient concentrations exert an inhibiting effect on microbial activity. Present after as well are substances such as sulfides which are capable of absorbing dissolved oxygen from the water by direct chemical reaction.

The factors affecting the oxygen demand test which were studied were the dissolved oxygen method employed, seeding, alkalinity, waste concentration and dilution water composition. Rate curves covering a period of as high as twenty days were established under various test conditions. Results of the investigations showed that the sodium oxide modification of the Winkler method was satisfactory for making the dissolved oxygen determinations associated with the oxygen demand test, that the waste should be neutralized with hydrochloric acid prior to making demand tests if the pH exceeded 8.5 and that a dilution water supplemented with nitrogen and phosphate salts gave most consistent results. Seeding of the dilution with either sewage or soil extract should be practiced since a lag is likely to occur in the rate if the initial numbers of bacteria in the dilutions are low. Agreement between different high waste dilutions was good. The method described in the new edition (ninth) of Standard Method of Water Analysis is as satisfactory as any of several similar test procedures if the modifications specified herein are employed.

The Saturday morning session ended with a progress report of the steps that have been taken, and remain to be taken in a survey of pulp mill sewer sampling that is being set up by R. R. Fuller of the Alkaline Pulping Committee at the University of Florida. This was followed by a general round-table discussion of reducing sewer losses in the alkaline pulping process.

Saturday afternoon closed the formal TAPPI convention. It included two papers prepared by T. T. Collins, Jr., one of them contributed by his associates at the Thilmany Pulp and Paper Company, C. R. Seaborne and A. W. Anthony, Jr. The first paper, on use of the venturi scrubber, was a progress report on initial tests at the world's first large-scale scrubber at the Thilmany plant in Kaukauna, Wis., reported that removal of sodium compounds from the stack gases is approximately 90 percent efficient under normal operating conditions. The second was a summary of a questionnaire return from kraft and soda mills on procedures for determining the chemical losses from recovery furnaces. It also described methods for chemical analysis of the recovered dust, and presented data on stack losses, dust loadings, and composition of the recovery furnace fume. Before the meeting was thrown open to a round-table discussion on reducing chemical losses in stack gases a study on operating experiences with Cottrell precipitators was presented by L. M. Roberts, C. E. Beaver and W. H. Blessing.

Thursday was given over to the host mills of the twin convention. An early morning start took the combined meetings to the mills of the Champion Paper and Fibre Company at Canton where the visitors were taken through the establishment from the log barker and rotary lime recovery units to the dry end of the big Champion paper and board machines. This Champion mill now is using 1200 cords of wood daily, about 1000 of this is pine. A new 150-ton Rotary is being installed which will enable the company to place one of its present three 50-ton kilns in reserve and still raise its daily recovery capacity from 150 to 250 tons.

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Luncheon was served in the Champion mill cafeteria and in itself constituted a high spot of the week for many who were present.

After lunch buses and private automobiles carried the crowd from Canton to the mill of the Ecusta Paper Corporation in the Pisgah National Forest near the town of Brevard. Welcomed to the mill by the Ecusta band the visitors were taken in small groups through the entire layout, and for most of them it was decidedly an eye-opening experience. This is a mill which specializes in cigarette paper with an impressive side-line of airmail paper. Its present site was a corn field some ten years ago, and it has been in production about eight years. Evidences of a streamlined production plan were as plainly defined as was the path of the visiting groups through the mill. After a preliminary visit to the converting section, where cigarette papers are packaged, the course of the trip passed to the great water filter layout. Here water from the Davidson river that rises back in the hills above the mill is passed through a filtering system that is second only to that of the city of Atlanta in the South. After filtration it is made into drinking water and passed into the mill. The storage buildings with their stacks of California and Minnesota flax stalks were next, and from them the guests passed along beside the conveyor belts that bring the flax to the digesters. Throughout the mill its exceptional cleanliness was emphasized by the use of white paint everywhere, white uniforms on the staff, white enamel even on the electric conveyor trucks.

Back in Asheville the guests were still in the hands of their hosts. A buffet supper was served in the Municipal Auditorium under the catering management of the Ecusta food service department. This was followed by a program of entertainment in which the local orchestra was augmented by amateur entertainment under the direction of John Eversman, Ecusta recreation director. General dancing brought the evening to an end.

Routine business found a place on the Saturday morning program of both the Southern and the Southeastern divisions of the superintendents. Mainly this consisted of elevation of officers by one step. Frank Jensen, first vice-president of the Southern division, was elected president; Phil Hanna was raised to succeed him; Andrew Downey became second vice-president and Roland Wilber was added to the slate as third vice-president.

In the same manner through promotion one step Harry J. Kruse became president of the Southeastern division, Lee M. Bauer its first vice-president, and Sidney Brown was added to the executive staff as second vice-president.

Among Those Registered

Abbott, O. C., The Bristol Co.; Abercrombie, Ralph P., Cheney Bigelow Wire Co.; Agronin, Tony, Shartle Bros. Machine Co.; Allen, R. K., The Babcock & Wilcox Co.; Allison, A. W., Improved Paper Machinery Co.; Archibald, E. E., Jr., Hollingsworth & Whitney Co.; Auchter, J. A., N. C. Pulp Co.; Augustine, Fred, Gaylord Container Corp.

Baber, John E., T. C. Heyward; Bailey, Bill L., Corn Products Sales Co.; Baker, H. T. & wife, H. T. Ferguson Co.; Baker, W. E. B., New York & Pennsylvania Co.; Barker, C. P. & wife, Container Corp. of America; Barnes, T. R. & wife, Champion Paper & Fibre Co.; Battison, William J., Champion Paper & Fibre Co.; Bauer, Lee M. & wife, Ecusta Paper Corp.; Beasley, B. & wife, The Brown Paper Mill Co.; Beaver, C. E., Research Corp.; Bechard, Gene & wife; Becker, Fritz K, Bird Machine Co.; Bennett, Raymond F. & wife, Ecusta Paper Corp.; Benson, H. K. & wife, University of Washington; Berdell, L. P., General Chemical Co.; Bergendahl, Carl J., N. Y. State College of Forestry; Bertram, L. L., Hercules Powder Co.; Betten, C. J., Champion Paper & Fibre Co.; Bixby, M. M., Hercules Powder Co.; Blaisdell, L. A., Kelco Company; Bobe, S. A., Westinghouse Electric Co.; Bolton, John G., John W. Bolton & Sons; Bond, Homer P., United States Rubber Co.; Borman, H. W., Southern Paperboard Corp.; Bowen, R. E. & wife, North Carolina Pulp Co.; Boyce, Fred C., D. J. Murray Co.; Boyd, Allen C., F. C. Huyck & Sons; Bramlett, J. E., Champion Paper & Fibre Co.; Brennan, J. E. & wife, Ecusta Paper Corp.; Brinkley, Frank, North Carolina Pulp Co.; Brook, Roscoe & wife, Simonds Saw & Steel Co.; Brooks, Arthur M., Raffold Process Co.; Brown, S. R. & wife, National Container Corp. of Va.; Bruffy, Fred, Florida Pulp & Paper Co.; Brumley, George, St. Marys Kraft Corp.; Bryant, E. O. & wife, Ecusta Paper Corp.; Brydges, W. H. & wife, National Container Corp. of Va.; Bullock, R. C. & wife, Ecusta Paper Corp.; Burnett, R. W., Crossett Lumber Co.; Burns, T. S., Union Bag & Paper Corp.; Bull, W. I., Champion Paper & Fibre Co.; Burrows, H. H. & wife, Raybestos-Manhattan, Inc.; Butterworth, De Haven Jr., H. W. Butterworth & Sons Co.

Cabble, Gilbert & wife, Excelsior Wire Mfg. Co.; Calo, D. R. & wife, Niagara Alkali Co.; Cameron, D. D., Hercules Powder Co.; Carpenter, Charles E., The Ohio Boxboard Co.; Cary, Jack F., Mathieson Alkali Works; Carter, O. F., The Mead Corp.; Cash, C. R. P. & wife, Brown Corp.; Chandler, J. B. & wife, The Bristol Co.; Champion, Chuck H., R. T. Vanderbilt Co., Inc.; Champagne, Lauless & wife, Gulf States Paper Co.; Charbonnier, H. Y., Union Bag & Paper Corp.; Cheshire, J. B. & wife, Johns-Manville Co.; Chesley, K. G., Crossett Lumber Co.; Christian, Banks, Walworth Company; Clark, C. L., Clark & Vicario Co.; Clarke, George L., Kimberly-Clark Corp.; Clayman, Samuel, Clinton Industries, Inc.; Clifford, Walter & wife, Penick & Ford; Cobaugh, G. D., Harbison-Walker Refractories Co.; Collins, T. T., Thilmany Pulp & Paper Co.; Connor, C. M., Glassine Paper Co.; Conquest, C. W., Ingersoll-Rand Co.; Cook, W. L., Paper Trade Journal; Cooper, A. M., Westinghouse Electric Co.; Cooper, George, Ecusta Paper Corp.; Cordes, O. C. & wife, Downingtown Mfg. Co.; Cornell, John, Paper Mill News; Corriston, J. W., Lavino & Co.; Cotten, Bruce, Socony Vacuum Oil Co.; Craigie, George W., American Pulp & Paper Mill Superintendents Assoc.; Crandall, H. C., Mosinee Paper Mills Co.; Crocker, Samuel Jr., John W. Bolton & Sons Co.; Crotty, J. E., General Electric Supply Co.; Crow, W. R., Weaks Supply Co., Ltd.; Current, W. J. & wife, Champion Paper & Fibre Co.; Cuyle, R. F., Hollingsworth & Whitney Co.

Dallgren, Sven, Bird Machine Co.; Davis, H. F., Wallace & Tiernan; Dean, Buel W. & wife, E. D. Jones & Sons Co.; Deffew, Harry W. & wife, Standard Paper Mfg. Co.; Degnan, John Raybestos-Manhattan; De Luca, E., Frazer Co., Ltd.; Dieffenderfer, J. C., Hercules Powder Co.; Disbro, G. A. & wife, W. S. Tyler Co.; Doutt, Fred, Champion Paper & Fibre Co.; Downey, Andrew, Florida Pulp & Paper Co.; Downs, M. L., Thilmany Pulp & Paper Co.; Draper, John Jr., Draper Brothers Co.; Durand, George, Port Huron Sulphite & Paper; Durant, L. G., Paper & Industrial Appliances; Durkee, C. L., D. J. Murray Mfg. Co.; Duskin, A. W., Crossett Lumber Co.

Earl, Robert Jr., Earl Paint Corp; Ebie, Elwood, Champion Paper & Fibre Co.; Edge, J. V., Downingtown Mfg. Co.; Eidness, F. A., Infilco, Inc.; Ekholm, K. I., National Analine; Elderkin, K. O., Crossett Lumber Co.; Ellen, Bruce E. & wife, Southern Paperboard Co.; Englev, Robert E., Walworth Co.; Erickson, E. W., Sutherland Refiner Corp.; Erspamer, August S. & wife, P. H. Glatfelter Co.; Essig, Phil M., Ingersoll-Rand; Every, Dernell, Kraft Paper Association.

Fahlstrom, Carl, Longview Fibre Co.; Farra, Harry & wife, Moore & White Co.; Farrell, J. K., Hercules Powder Co.; Farris, Melvin, Southland Paper Mills, Inc.; Fellows, Bob, Reichhold Chemical Co.; Fish, Harold H. & wife, Kieckhefer Container Corp.; Flanders, C. E., Jay Madden Corp.; Fleck, L. C., Kimberly-Clark Corp.; Fleenor, E. B., Socony-Vacuum Oil Co.; Foster, P. M., Williams-Gray Co.; Francis, Garland S., Carolina Paperboard Corp.; Fryfogle, Kenneth, Brandon Corp.; Fuller, Robert R. & wife, Gulf States Paper Corp.

Gardner, W. S., Crossett Lumber Co.; Gates, L. E. & wife, Champion Paper & Fibre Co.; Gephart, O. P., A. M. Meincke & Sons; Germanson, R. C., Kalamazoo Vegetable Parchment Co.; Gillespie, A. E., Champion Paper & Fibre Co.; Gillespie, W. F. & wife, Gaylord Container Co.; Glass, Walter, F. C. Huyck & Sons; Goepfert, Otto & wife, Ecusta Paper Corp.; Goldman, Horace & wife, The Mead Corporation; Goodwin, R. G., Paper & Industrial App.; Gray, Fred, Socony Vacuum Oil Co.; Green, Raymond E., Rao Electrical Equip. Co.; Green, W. E., W. E. Greene Corp.; Green, Rudolph T., S. D. Warren Co.; Griffin, A. E., Camp Mfg. Co.; Griffiths, Leonard L. Jr., Draper Brothers Co.; Growdon, Leonard R., The Mead Corp.; Guest, K. M., National Container Corp.

Hagey, Gray, Ohio Boxboard Co.; Hall, E. H., Morey Paper Mill Supply Co.; Hall, G. Bancroft, Morey Paper Mill Supply Co.; Hall, James E. & wife, Champion Paper & Fibre Co.; Hall, Walter, The Mead Corp.; Hannan, Philip J. & wife, Southern Advance Bag & Paper Co.; Hansen, Harold & wife, Champion Paper & Fibre Co.; Happ, E. L. & wife, Ecusta Paper Corp.; Hardaker, George & wife, Lockport Felt Co.; Harrison, Ward D. & wife, Ecusta Paper Corp.; Hart, John F., Longview Fibre Co.; Hart, J. S., Pulp & Paper Research Inst. of Canada; Harter, Ray E., R. T. Vanderbilt Co., Inc.; Hartley, A. M., Nopco Chemical Co.; Hausmann, P. E., Noble & Wood Machine Co.; Helder, H. A., Champion Paper & Fibre Co.; Hella, Roy P., Northwest Paper Co.; Hellas, Helen, C. John Mansville; Hellberg, S. D., Camp Manufacturing Co.; Hemphill, J. W. & wife, Johns-Manville Co.; W. W. Henderson & Sons; Henderson, W. W. & wife, W. W. Henderson & Sons; Henderlite, James H., Wallace & Tiernan Co.; Hendrix, Walter L., Herty Foundation; Hentschel, Albert A. & wife, Flintkote, Inc.; Hermann, G. A., The Hermann Mfg. Co.; Herrlinger, R. M., American Cyanamid Co.; Heyward, T. C., T. C. Heyward Co.; Hill, E. H., Corn Products Sales Co.; Hill, G. G., Champion Paper & Fibre Co.; Hisey, W. O., Union Corporation, Ltd.; Hitt, A. H., U. S. Rubber Co.; Hobaugh, E. L. & wife, St. Joe Paper Co.; Holland, D. C., General Chemical Co.; Hollihan, J. L., Port Huron Sulphite & Paper Co.; Homan, J. B., A. E. Staley Mfg. Co.; Hoolhan, J. L., Port Huron Sulphite & Paper Co.; Hulmes, Harry, U. S. Rubber Co.; Humphrey, N. Allen, Johns-Manville Sales Corp.; Hunsicker, C. R., Container Corp. of America; Hunter, J. E. Jr., Ecusta Paper Corp.; Hutton, F. E., Babcock & Wilcox; Hyde, A. P. The Bristol Co.

Inskip, E. S., R. T. Vanderbilt Co.

Jaeger, A. O., American Cyanamid Co.; Jennings, W. H., Camp Manufacturing Co.; Johnson, J. Bracken, Virginia Smelting Co.; Johnson, Tom C., Union Bag & Paper Corp.; Johnson, T. L., Philadelphia Felt Co.; Johnson, W. E., Combustion Engineering Co.; Johnston, I. W., Dorr Co.; Jones, H. Duncan, Raybestos Manhattan, Inc.; Jones, Dwight E., E. D. Jones & Sons Co.; Jones, W. C. R., Howard Smith Paper Co.; Jones, Clyde G. & wife, Ecusta Paper Corp.

Kahn, J. M., Infilco, Inc.; Kearney, J. E., Swenson Evaporator Co.; Kesling, J. P., The Dicalite Co.; Kennedy, E. H., Combustion Engineering Co.; King, J. G., Champion Paper & Fibre Co.; King, W. W., W. S. Tyler Co.; Kirchen, C. P., Buckman Laboratories, Inc.; Kozma, Frank, West Virginia Pulp & Paper Co.; Krebs, W. J. & wife, Pulp & Paper Industry; Kruse, Fred & wife, Chesapeake Corp.; Kruse, H. J. & wife, Albemarle Paper Mfg. Co.; Krauss, W. W., Brunswick Pulp & Paper Co.; Kumler, Ralph W., American Cyanamid & Chem. Co.

LaChance, J. H. & wife, Rayonier, Inc.; Lacy, J. B., Ingersoll Rand; Lang, Lloyd, Crossett Lumber Co.; Lassiter, C. T. & wife, Penick & Ford; Latimer, Homer H., Champion Paper & Fibre Co.; Lawrence, W. P. & wife, Champion Paper & Fibre Co.; Lear, George & wife, Moore & White Co.; LeClerc, A. B., T. C. Heyward; Lee, James A., McGraw-Hill Publishing Co.; Leighton, A. J., Babcock & Wilcox; Levy, R. M. & wife, Ecusta Paper Corp.; Lewis, J. G., Rayonier, Inc.; Lindsay, Penn. R., E. I. Dupont de Nemours & Co.; Lockwood, George E., Lockwood Trade Journal Co.; Lowe, James C., Oliver United Filters, Inc.; Ludwig, Charles T. & wife, The Mead Corp.; Lukemire, E. L., The Dicalite Co.; Luker, W. D., Union Bag & Paper Corp.; Luttrell, M. H., Walworth Co.; Lyon, M. G. & wife, Champion Paper & Fibre Co.

McAlear, James, Mason-Neilan Regulator Co.; McAndrews, Frank, Sonoco Products; McAllister, J. W. wife, Paper Products Mfg. Co.; McCall, F. S., Union Bag & Paper Co.; McCauthy, Charles, Southern Paper Board Corp.; McCall, P. L., Sonoco Products Co.; McCollough, J. L., Southland Paper Mills; McCombs, F., Niagara Alkali Co.; McGinn, E. P., Sutherland Refiner Corp.; McGray, R. L., Crossett Lumber Co.; McGregor, George H., Minnesota & Ontario Paper Co.; McIntyre, J. A., Sonoco Products; McPherson, J. A., Mosinee Paper Mill Co.; McSwiney, J. W., Brunswick Pulp & Paper Co.; McGlothlin, L. D., Crown-Zellerbach Corp.;

Macdonald, R. G., TAPPI; Mannin, Lawrence H., Morris Machine Works; Martin, H. C., Brown Paper Mill Co.; Martin, Wm. T., Minnesota & Ontario Paper Co.; Martin, R. B. & wife, Wallace & Tiernan Co.; Mason, H. E. & wife, Howard Smith Paper Mills; Matthews, R. E. & wife, Ecusta Paper Corp.; Mauldin, Earle, McGraw-Hill Publishing Co.; Mazer, J., Hudson Pulp & Paper Corp.; Meade, R. S., American Cyanamid Corp.; Mease, C. M., & wife, Southern Chemical Cotton Co.; Metcalf, D. C. & wife, The Brown Paper Mill Co.; Micklem, A. C., Continental Can Co.; Mills, R. H., J. E. Sirrine Co.; Mitchell, W. W. & wife, Champion Paper & Fibre Co.; Montville, A. H. & wife, Ecusta Paper Corp.; Montville, D. H. & wife, Shartle Brothers Machine Co.; Moon, D. G. & wife, J. E. Sirrine Co.; Moor, J. P., E. I. Dupont de Nemours & Co.; Morehouse, Walter B. & wife, Nopco Chemical Co.; Morgan, H. A. & wife, Weyerhaeuser Timber Co.; Morrison, H. A. & wife, Oliver United Filters Inc.; Motz, G. E., Nopco Chemical Co.

Nadelman, A. H. & wife, International Paper Co.; Natwick, J. W., The Bauer Brothers Co.; Navarre, A. J., Orange Pulp & Paper Mills; Navidonski, Mrs. Nadine, Union Bag & Paper Corp.; Neese, E. H., Jr., Beloit Iron Works; Newell, Carl B., Simonds Saw & Steel Co.; Newmann, P. F., Hercules Powder Co.; Newman, W. C. Jr., Southern Advance Bag & Paper Co.; Nicholson, C. W. E., Union Bag & Paper Corp.; Nicholson, H. T. & wife, District of Columbia Paper Mills; Nicholson, L. D. & wife, District of Columbia Paper Mills; Nickle, H. D., Combustion Engineering Co.; Nielson, Tor, M. Peterson & Son; Nolan, W. J., University of Florida; Noreus, R. E., Northwest Paper Co.; Norton, S. G., Hercules Powder Co.; Noteware, Max, American Pulp & Paper Co.

O'Brien, J. J., Paper Mill News; O'Connell, John H., John H. O'Connell Co.; O'Connor, Stanley J., Minnesota & Ontario Paper Co.; O'Neil, C. J., Johns-Manville Sales Corp.; Orloff, H. D., Howard Smith Paper Mills; Ory, Wallace F. & wife, Celotex Co.; Owen, L. B. & wife, Fernstorm Paper Mills, Inc.; Owens, Russell, North Carolina Pulp Co.; Owens, V. P., Combustion Engineering Co.; Oxford, C. E., C. M. Guest & Sons; Oxley, Fred W., Raybestos Manhattan.

Parks, Gilbert F., Fitchburg Paper Co.; Parmenter, E. F., Champion Paper & Fibre Co.; Parnell, W. E., Crossett Lumber Co.; Penfield, W. E., Gulf States Paper Corp.; Pennings, A. F., Waterbury Felt Co.; Pesch, A. W., International Paper Corp.; Phinney, R. E. & wife, Container Corp. of America; Pierce, B. B., Gaylord Container Corp.; Pierce, J. L., The Foxboro Co.; Pierce, H. O., Solvay Process Co.; Pieno, Malcolm, Brunswick Pulp & Paper Co.; Plant, E. K., Pittsburgh Plate Glass Co.; Porter, C. C., Southland Paper Mills Inc.; Priest, John J. & wife, Halifax Paper Co.; Prince, R. K., Allis-Chalmers Co.; Privette, H. J., R. J. Reynolds Tobacco Co.; Putney, W. G., Philadelphia Felt.

Raines, J. N., Lindsay Wire Weaving Co.; Ramsey, T. E., Ecusta Paper Corp.; Ream, A. M. & wife, Ecusta Paper Corp.; Reese, John E., Hercules Powder Co.; Reeves, Henry Jr., Hercules Powder Co.; Reynolds, Robert B., Hollingsworth & Whitney Co.; Rhoads, C. B., West Virginia Pulp & Paper Co.; Richardson, W. S., Gaylord Container Corp.; Rider, T., H. Waterbury & Sons Co.; Rinehart, W. F., Lobdell Co.; Ritenbough, Wm. H., Heppenstall Co.; Roane, H. C., Bowser Co., Inc.; Roberts, H. L., The Sinclair Co.; Roberts, J. T., Johns-Manville Co.; Roberts, F. M., Research Corp.; Robinson, C. P., Heppenstall Co.; Robinson, E. K., Howard Smith Paper Co.; Robinson, John D. & wife, John D. Robinson & Co.; Rodabaugh, E. E., New York & Pennsylvania Co.; Rooney, W. S., Albany Felt Co.; Ross, P. W., Union Bag & Paper Corp.; Roth, C. E., The Mead Corp.; Rozeskie, C. T., H. Waterbury & Sons Co.; Ruff, H. T., The Mead Corp.; Rutherford, R. T., Raybestos-Manhattan.

Semmens, George, Australian Paper Manufacturers Ltd.; Scheurmann, J. S. & wife, Cameron Machine Co.; Scheurmann, Yvonne, Cameron Machine Co.; Schilt, E. A., Zaremba Co., Inc.; Schlafge, W. H., Minnesota & Ontario Paper Co.; Schuber, John, Solvay Process Co.; Scott, Norman B. & wife, Orr Felt & Blanket Co.; Shaw, W. M. & wife, Ecusta Paper Corp.; Shirlaw, M. B., Howard Smith Paper Mills; Simoneaux, C. S. & wife, Celotex Corp.; Sigmon, H. W., Ecusta Paper Corp.; Singletary, G. K., Brunswick Pulp & Paper Co.; Smith, Herbert A., Mead Corp.; Smith, H. Wm. Jr., Cameron Machine Co.; Smith, J. Frank, The Mead Corporation; Smith, T. Gunter, Walworth Co.; Snipes, A. D., Westinghouse Electric Co.; Snyder, A. J., Reichhold Chemical Co.; Spalding, C. P., Beloit Iron Works; Sproull, Reavis C., Southern Research Institute; Staky, C. E., D. J. Murray Co.; Steadman, B. K., Reynolds Metals Co.; Stevens, Gilbert M., Minnesota & Ontario Paper Co.; Stevens, R. H., National Container; Stitt, C. N., Sutherland Refiner Corp.; Stone, C. A., Champion Paper & Fibre Co.; Storin, G. K., Niagara Alkali Co.; Strapp, R. K., Pulp & Paper Research Inst. of Canada; Strasser, J. T., Stein-Hall Company; Strausbaugh, Ralph R., P. H. Glatfelter Co.; Strong, M. D., The Mead Corporation; Suiter, V. P., Johns-Manville Sales Corp.; Summers, B. S., Borthurson Sulphite & Paper; Sutherland, Douglas G., Sutherland Refiner Corp.; Sutherland, Lionel, Sutherland Refiner Corp.; Suttle, J. W. & wife, Southern Advance Bag & Paper; Suttle, Ruth, Southern Advance & Paper.

Taylor, Louis B., Pittsburgh Plate Glass Co.; Taylor, Ruel E., Mason-Neilan Regulator Co.; Taylor, T. W., Augusta Iron Works; Temple, R. U. & wife, Moore & White Co.; Tennent, G. R., Continental Can Co.; Thielens, W. P., Gulf States Paper Corp.; Theobald, O. J. Jr., Mathieson Alkali Works, Inc.; Thomas, David, Bagley & Sewall Co.; Thompson, George, B. F. Perkins; Thompson, L. A., Hercules Powder Co.; Thompson, R. E., Ansul Chemical Co.; Thorpe, J. Wrixon, Australian Paper Manufacturers Ltd.; Tipka, Vernon, Bird Machine Co.; Trammell, R. T., Champion Paper & Fibre Co.; Trostel, George M., Champion Paper & Fibre Co.; True, O. S., U. S. Rubber Co.; Tuten, Alvin, N. C. Pulp Co.; Tweed, E. E., Stein-Hall Co.

Vannah, H. P., Ecusta Paper Corp.; Venart, Charles, Southern Paper Board; Vernon, H. M., Continental Can Co.; Vicario, C., Clark & Vicario Co.; Voights, Donald E., American Pulp & Paper Co.; Vokes, R. F., Dilts Machine Works; Vranian, Henry, The Chesapeake Corp.; Vanderburg, J. L., R. T. Vanderbilt Co., Inc.; Vallandingham, V. V., Kelco Co.; Vanderberg, H. L. & wife, A. E. Staley Mfg. Co.

Wachter, William, Mead Corp.; Wallace, M. W., Continental Can Co.; Walseth, Institute of Paper Chemistry; Warner, Sterling O., Chromium Corp. of America; Waters, Vincent F., & wife, Southern Pulp & Paper Journal; Weaks, George Jr., Weaks Supply Co.; Wear, P. G., Penick & Ford Ltd., Inc.; Webb, C. A., Union Bag & Paper Co.; Wehr, H. E. & wife, The Mead Corp.; Weil, Norman O., W. S. Tyler Co.; Welte, Carl T., Champion Paper & Fibre Co.; Welton, Wright M., West Virginia Pulp & Paper Co.; West, P. H., Thilmany Pulp & Paper Co.; Weston, Harry E., Paper Industry & Paper World; Wheelen, S. J., Schuler & Benninghofen; Wheless, R. E. L., Camp Mfg. Co.; White, R. B., Sonoco Products Co.; Whitener, Jack, Alexander Brothers; Whitfield, J. E., The Brown Paper Mill Co.; Witham, George, Orr Felt & Blanket Co.; Witham, C. L., Ciba Company, Inc.; Wiley, Paul R., West Virginia Pulp & Paper Co.; Wilkins, C. W., Bedford Pulp & Paper Co.; Williams, J. M., Champion Paper & Fibre Co.; Woodside, Vernon, Mathieson Alkali Co.; Yoder, R. L., Gulf States Paper Corp.; Young, G. H. Midwest-Fulton Machine Co.; Young, J. F., Brown Paper Mill Co., Inc.; Youngchild, C. E., Paper Mill Consultant; Yunker, W. S. & wife, The Foxboro Co.

Zellers, F. L. & wife, Chillicothe Co.

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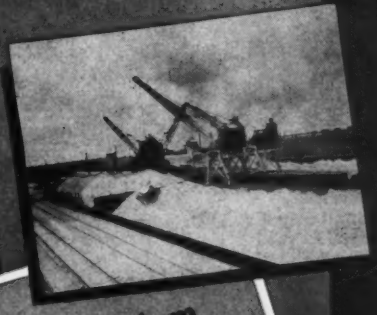

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IMPORTS

NEW YORK IMPORTS

WEEK ENDING OCTOBER 11, 1947

SUMMARY

Newsprint	3845 rolls
Printing Paper	497 rolls
Wrapping Paper	228 rolls
Gummed Paper	88 cs., 1 drum
Paperhangings	4 cs.
Writing Paper	3 cs.
Photo Paper	1 cs.
Paper Serviettes	12 crts., 14 bls.
Drawing Paper	1 cs.
Filter Paper	23 cs.
Miscellaneous Paper	1 cs.

NEWSPRINT

Newark Evening News, Idefjord, Oslo, 245 rolls.
Watchtower Bible & Tract Society, Idefjord, Oslo, 356 rolls.
Pagel Horton & Co., Inc., Idefjord, Oslo, 752 rolls.
R. A. Olsen Co., G.T.D., Donnacona, 370 rolls.
Paper Clearing House, Inc., Gainesville Victory, Antwerp, 93 rolls.
R. A. Olsen Co., G.D.D., Donnacona, 397 rolls.
Madden Reeve Angel & Co., Vretaholm, Kotka, 1025 rolls.
R. A. Olsen Co., A.C.D., Donnacona, 374 rolls.
National City Bank, Veendam, Rotterdam, 233 rolls.

PRINTING PAPER

Madden Reeve Angel & Co., Vretaholm, Kotka, 497 rolls.

WRAPPING PAPER

Jay Madden Corp., Vretaholm, Kotka, 228 rolls.

GUMMED PAPER

B. F. Drakenfeld & Co., Medea, Liverpool, 88 cs., 1 drum.

PAPERHANGINGS

H. W. Robinson & Co., Port Lyttleton, London, 2 cs.
Judson Sheldon Div. National Carloading Corp., Port Lyttleton, London, 2 cs.

WRITING PAPER

American Express Co., Oregon, Havre, 3 cs.

PHOTO PAPER

J. J. Gavin Co., Port Lyttleton, London, 1 cs.

PAPER SERVIETTES

Wesley & Winters, Port Lyttleton, London, 12 crates.
H. W. Robinson & Co., Port Lyttleton, London, 14 bls.

DRAWING PAPER

H. Reeve Angel & Co., Inc., Port Lyttleton, London, 1 cs.

FILTER PAPER

H. Reeve Angel & Co., Inc., Port Lyttleton, London, 23 cs.

MISCELLANEOUS PAPER

De Laval Separator Co., Idefjord, Oslo, 1 cs.
C. F. Lamalle, Gainesville Victory, Antwerp, 6 pkgs. (samples).

RAGS, BAGGINGS, ETC.

(———), Medea, Liverpool, 20 bls. new wool rags.
National City Bank, City of Calcutta, Durban, 655 bls. paper waste.
Royal Manufacturing Co., Creighton Victory, Antwerp, 75 bls. cotton waste.
C. Comiter Co., Lidvard, Shanghai, 500 bls. cotton waste.
(———), Port Lyttleton, London, 109 bls. old webbing rags.
Irving Trust Co., Port Lyttleton, London, 61 bls. New colored cotton rags.
State Street Trust Co., Tropez, Naples, 265 bls. dark cottons.
J. Stein, Bowgran, Buenos Aires, 9 bls. rags.

OLD ROPE

International Purchasing Co., Argentina, Copenhagen, 172 coils old rope.
(———), Lamborook, Calcutta, 418 bls. old hemp rope cuttings.
R. L. Pritchard, Citrone, Calcutta, 85 bls. old hemp rope cuttings.
(———), Citrone, Calcutta, 718 bls. old hemp rope cuttings.
National City Bank, Citrone, Calcutta, 65 bls. rope cuttings.

CASEIN

Paul A. Dunkel, Mormacwren, Buenos Aires, 833 bags casein.
Paul A. Dunkel, Bowgran, Buenos Aires, 1000 bags lactic casein.

GLUESTOCK, ETC.

H. Remis Co., Atlantic Coast, Santos, 198 bls. gluestock.
Trans-Atlantic Animal By Products Corp., Atlantic Coast, Santos, 500 bags boneglue.
(———), Cable Eye, Vera Cruz, 112 bls. gluestock.

WOODPULP BOARDS

Jay Madden Corp., Vretaholm, Kotka, 1271 rolls, 133 bls. (solid white).

ALBANY IMPORTS

Pagel Horton & Co., Inc., James E. Hamlind, Hornefors, 3048 bls. dry sulphite pulp.
Cellulose Sales Co., James E. Hamlind, Munksund, 8800 bls. kraft sulphate pulp.
Cellulose Sales Co., James E. Hamlind, Obbola, 15,400 bls. dry sulphate pulp.
Cellulose Sales Co., James E. Hamlind, Sundsvall, 9390 bls. dry sulphite pulp; 2370 bls. kraft sulphate pulp.

PHILADELPHIA IMPORTS

Jay Madden Corp., Vretaholm, Kotka, 105 rolls wrapping paper; 515 rolls solid white woodpulp boards.
Pulp Sales Corp., Vretaholm, Kotka, 4428 bls. prime unbleached sulphate pulp; 9556 bls. prime unbleached sulphite pulp.

BALTIMORE IMPORTS

Madden Reeve Angel & Co., Vretaholm, Kotka, 1541 rolls newsprint.
Pulp Sales Corp., Vretaholm, Kotka, 2350 bls. prime unbleached sulphite pulp; 533 bls. prime bleached sulphite pulp; 3083 bls. prime unbleached sulphate pulp.

NORFOLK IMPORTS

E. J. Keller Co., Inc., Gainesville, Victory, Antwerp, 64 bls. old gunny bagging.
Rohner Gehrig & Co., Gainesville Victory, Rotterdam, 271 bls. old gunny bagging.

International to Spend $1,250,000 at Niagara Falls Plant

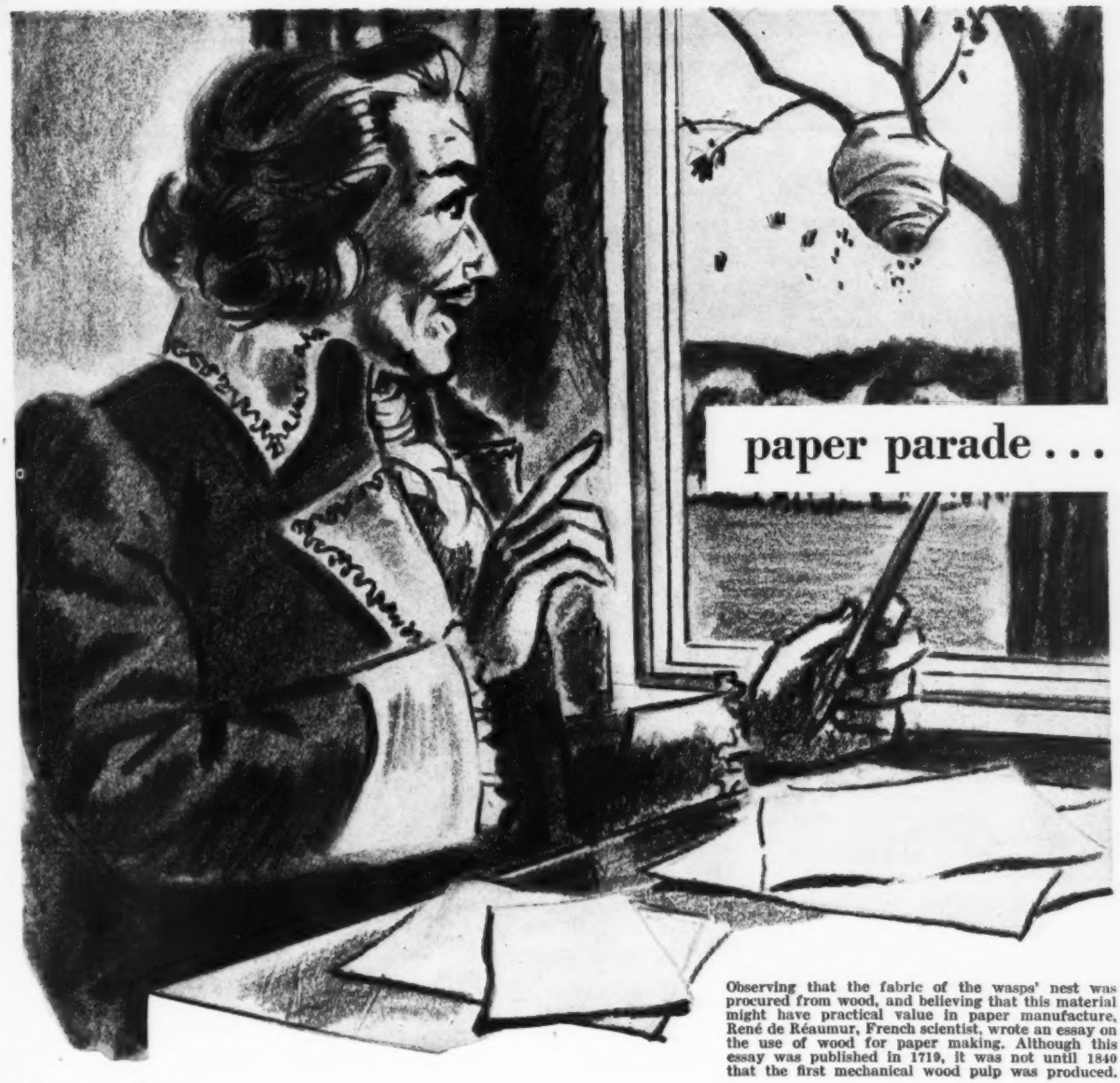
NIAGARA FALLS, N. Y.—The International Paper Company will spend about $1,250,000 on construction during 1948 at its local plant. The Niagara Falls plant will spend about $225,000 of its appropriation for the construction of a steam boiler plant. Other portions of the allotment will be spent for general paper-making equipment.

Another sizable portion of the local expenditure will be for facilities for pulp storage, it was added.

Package Machinery Invites Its Neighbors

SPRINGFIELD, Mass.—More than 3000 persons toured the Package Machinery corporation's East Longmeadow plant recently as that concern held open house to employes, their families and the general public.

It was the first time the public had been allowed to tour the nine-acre, one-story plant, one of the most modern in the country, which was recently purchased by the firm from the War Assets Administration. A nursery was set up to care for children as their parents went on the conducted tours of the plant.



Observing that the fabric of the wasps' nest was procured from wood, and believing that this material might have practical value in paper manufacture, René de Réaumur, French scientist, wrote an essay on the use of wood for paper making. Although this essay was published in 1719, it was not until 1840 that the first mechanical wood pulp was produced.

Out of a wasps' nest came the fabric of an idea!

FROM papyrus to parchment, from rags to wood pulp . . . methods and materials have changed, but the search for a *finer* paper still continues. That is why, in the current production of high-quality *coated paper,* so many manufacturers have turned to a high-grade Precipitated Calcium Carbonate.

As a paper-coating pigment, Wyandotte Precipitated Calcium Carbonate is unequaled — in brightness and freedom from grit and abrasiveness . . . in hiding power and ink absorption . . . in the smoothness and uniformity which are so essential to fine coating.

Wyandotte recently completed a great, new $2,000,000 plant to provide more of this superlative coating pigment so much in demand by the paper industry.

FOR TECHNICAL BULLETINS WRITE:

WYANDOTTE CHEMICALS CORPORATION

WYANDOTTE, MICHIGAN • OFFICES IN PRINCIPAL CITIES

Soda Ash • Caustic Soda • Bicarbonate of Soda • Calcium Carbonate • Calcium Chloride • Chlorine • Hydrogen • Dry Ice • Glycols
Ethylene Dichloride • Propylene Dichloride • Chloroethers • Aromatic Sulfonic Acid Derivatives • Other Organic and Inorganic Chemicals

Wyandotte
REG. U. S. PAT. OFF.

TRENDS

Office of the PAPER TRADE JOURNAL,
Wednesday, October 15, 1947.

Though the heavy Fall demand for paper and board gives the appearance of an unchanged situation, actually the relationship between supply and consumption has improved over the past months; and it is expected that the situation will continue to ease on all grades—except newsprint—during the balance of this year and in 1948 as scheduled new capacity gradually comes into production.

September production was about on a par with that of September, 1946, with pulpwood supplies adequate. The shortage of box cars, particularly in the central western and northwestern districts, remains a factor, although freight carloadings reached a high for the year during the week of September 27 when 937,954 cars were loaded, an increase of 2.3 percent over the corresponding week in 1946. It is estimated that an increase of 6.2 percent will be reached for the fourth quarter of 1947 over the same period of 1946.

Variations in the supply and demand appear by geographic regions as well as by grades or items. Generally, shortages are reported in kraft wrapping paper, butchers paper, grocery bags, toilet paper, newsprint, sulphite bonds, coated and enameled papers, while those in fair supply are towels and napkins, facial tissues, millinery bags, greeting cards, high-content rag papers, glassine and cellophane bags.

There appears to be an ever-widening field of new uses; no former significant use has disappeared. The trend is accelerated by numerous wartime innovations, the demands for new packaging for frozen foods, et cetera, and the huge requirements for multiwall paper bags with new uses springing up daily. It is estimated that 250,000,000 may be used annually for the shipment of fertilizers and fertilizer ingredients alone. Thus domestic requirements for paper and board are by far the highest in history.

The trend of higher prices which resulted through the tight supply situation, high production and operating costs, as well as higher capital investments have been accepted so long as more and better quality paper can be procured.

The prospects are that the market will retain its firmness, that raw materials will be converted into the higher grades with B grades scarce and priced out of proportion, and the lower grades almost off the market.

The index of general business activity for the week ended October 4 declined to 140.8 from 142.3 in the preceding week, compared with 132.7 in the corresponding week of 1946. The index of paperboard production declined to 160.3 from 166.7 in the preceding week, compared with 156.2 for the corresponding week of 1946.

Paper production for the week ended October 4 was estimated at 109.5 percent compared with 107.0 for the preceding week, with 107.2 percent for the corresponding week in 1946, with 94.1 for 1945, and with 93.4 percent for the corresponding week in 1944.

Paperboard production for the week ended October 4 was 100.0 percent of capacity, compared with 102.0 percent for the preceding week, with 100.0 percent for the corresponding week in 1946, with 95.0 for 1945, and with 96.0 percent for the corresponding week in 1944.

Woodpulp

The non-integrated segment of the industry continues to give serious attention to the problem of obtaining additional pulp supplies, with no change apparent in the situation. Finnish pulp and paper mills have been ordered by the National Power Chief to use less power because of the exceptionally low water level, while the hope of drawing pulp from Norway is not very bright because of their need of domestic timber for reconstruction and a shortage of loggers, leaving their pulp and cellulose production but a fraction of prewar. Plans to establish an important lumber industry in the Netherland Indies may in the dim future bring some relief to the world's shortage.

Fine Papers

Prices are still in a state of flux with rises in nearly all types and grades since mid-August. Bonds and ledgers of 100 percent rag content remain static, while those of 75 percent or less rag rose from $1.25 to $2.50 a carton. Sulphite bonds and ledgers No. 4 advanced 75 cents per carton. . . . Rises in glossy coateds average $1 per case, and the various grades of No. 2 offset range from $14.15 to $17.90 per case. Book papers, Grade A, are upped $1 a case, with Grade B out of proportion and C and D unobtainable. Demand continues well ahead of supply, and the market is expected to be reasonably firm for the balance of the quarter.

Waste Paper

Old corrugated papers, No. 1, developed a wide range of activity this week. Trade sources quoted mill prices at $30 to $34 a ton. Posting of the monthly price list which usually serves as a fair guide to the industry locally did little to settle the issue as to whether dealers or mills were right; and as the week got under way dealer sales were reportedly being made anywhere between the above-mentioned $30 and $34 figures. Confusion was reported on all sides. Meanwhile other waste paper items showed steadiness with No. 1 news quoted at $18 to $29 a ton and No. 1 mixed at $15 a ton. Local reports indicated that demand was strong for all grades and those close to the market stating that supplies were fairly adequate. Collections seem to be improving with the advent of school and continuation of good weather.

Ohio Paper Signs First Contract Grants 10-Cent Boost

MIAMISBURG, Ohio—A 10-cent general wage boost was gained by Local 59 in its first contract wih the Ohio Paper Company.

Besides the general increase, employes in the factory division received an additional 5 cents an hour. Wage adjustments from 5 to 20 cents an hour were gained by maintenance employes. The contract also provides for shift bonuses of 4 cents for the second shift and 6 cents for the third, time and one-half for over 8 hours and for Saturday work, double time for over 12 hours and for Sunday.

A liberal vacation plan was included in the contract. The plan provides for 3 days' paid vacation after 6 months' service, 6 days' paid vacation after a year and 12 days after 3 years.

The contract calls for 2 hours guaranteed reporting time and 4 hours' call-in time, grievance procedure, seniority protection and check-off.

While much has been accomplished by this first contract, the union looks forward to greater benefits through continued collective bargaining.

Griswold Addresses Milton Forum

NEW YORK — Benefits derived from twelve years of research in lithography —as related to the paper field—were interestingly explained to members and guests of the Milton Paper Company at the monthly Milton Sales Forum, by Wade F. Griswold, executive director of the Lithographic Technical Foundation. Mr. Griswold's remarks paved the way for a recording prepared by Professor Robert F. Reed, director of Lithographic Technical Foundation's research program, on latest developments and problems in lithographic paper.

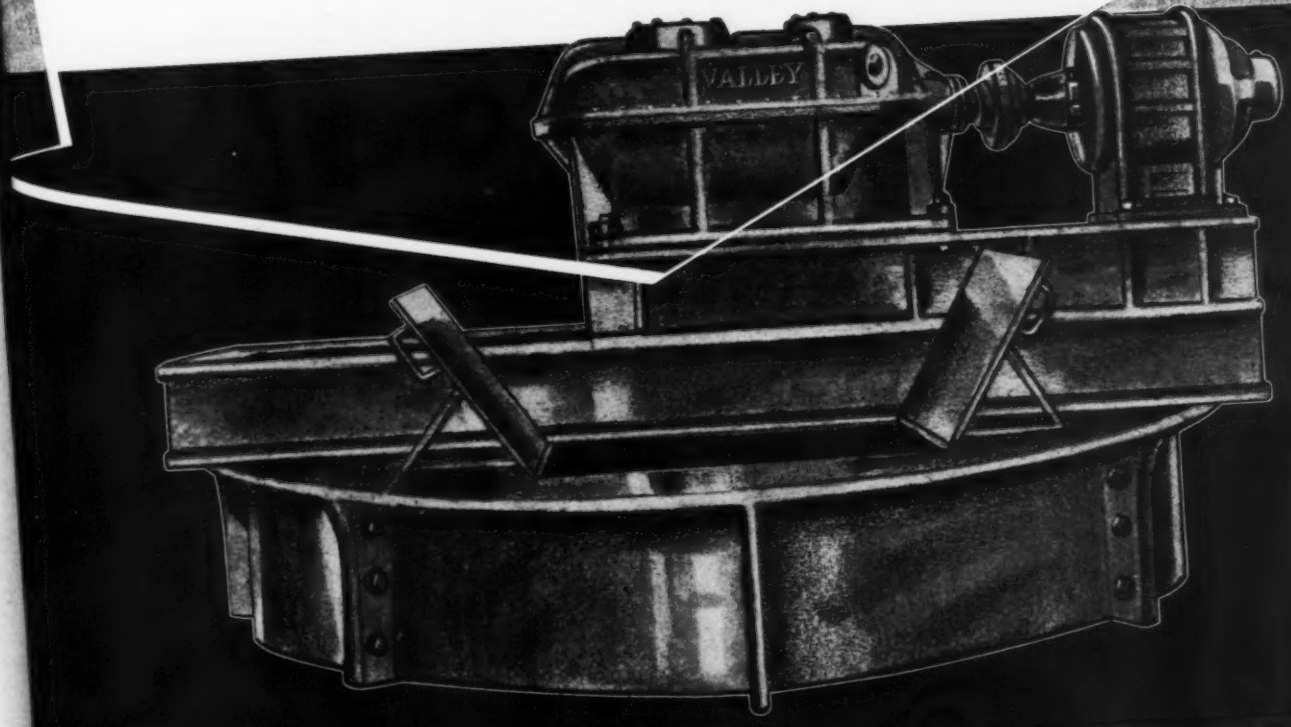
Introduced by Samuel Gifford, secretary-treasurer of the Milton Paper Company, Mr. Griswold stated his pleasure at discussing "research and other programs of the lithographic industry's cooperative institution with those who are in direct contact with lithographers and their problems."

INSTANTANEOUS PULPING!

because . . . All the pulp hits an explosion chamber the instant it is fed, and emerges — PULPED.

because . . . All pulp is instantaneously wetted.

because . . . The guided vaned circulation channels of this great pulper assures positive vigorous circulation and prevent by-passing and dead spots.



Write for full information
VALLEY IRON WORKS
Appleton, Wisconsin

THE VALLEY-VORTEX PULPER

PRICES

With the elimination of price controls on paper, pulp, rags and other materials, the quotations given below once more become indicative of trends in an open market. At the moment they can be of little more, for, while some volume business still is being done under contract at the figures given below, fluctuations representing special conditions are too varied and too frequent to permit prices to be given as representing a wholly stabilized market.

Paper

(Delivered New York)

Standard News, per ton—
Roll, contract ....$87.50 to $90.00
Sheets .....$109.00 " —

Kraft—per cwt.—Carload Quantities

Zone A, Delivered 40 lb. base weight			
Superstandard Wrapping	$7.00	to	—
No. 1 Wrapping	6.50	"	6.75
Standard Wrapping	6.00	"	6.25
Standard Bag	5.75	"	6.25

Tissues—Per Ream 24x36 (480) 10 lb. Zone 1.

Wh. No. 1 Frd.	$1.65	to	$1.72
Wh. No. 1 M. G.	1.65	"	1.72
Wh. No. 1½	1.48	"	—
Wh. No. 2	1.55	"	—
Kraft Anti-Tar	1.38½	"	—
Kraft Unbl.	1.85	"	—
Manila No. 2	1.62	"	—

Toilet—Per Case of 100 rolls—1 M Sheets.

Unbleached	$5.50	to	$6.40
Bleached	6.50	"	7.60

Paper Towels—Per Case of 3750—Zone 1.

Wh. Jr. M'tif'd 9¼x9½	$4.85
Br. Sr M'tif'd 10x12	3.45
Br. Jr. M'tif'd 9½x9¾	2.95
Br. Jr. Sgl. fold 10x10¾	3.10

Manila—per cwt.—C. l. f. a.

No. 1 Jute Tag	$13.80
Reg. Jute Manila	13.25
No. 1 Manila	9.75

Boards, per ton—

News	$92.50	"	—
Chip	90.00	"	—
Sgl. Mla. L1 Chip*	102.50	"	—
White Pat. Coated*	120.00	"	—
Kraft Liners 42 lb.	95.00	"	—
Binders Boards	126.00	"	—

* Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following prices are representative of distributors' resale prices, all deliveries in Zone 1: Rag Content Bonds and Ledgers—

White, Assorted Items Bonds, per cwt.

	Carton	4 C't'n	Ton
100% Rag Ext. No. 1	$54.00	$50.00	$48.00
100% Rag	47.50	44.00	42.00
75% Rag	37.50	34.00	32.50
50% Rag	31.50	28.75	27.50
25% Rag	28.00	25.50	24.50

Ledgers, per cwt.

100% Rag Ext No. 1	$54.25	$50.00	$48.00
100% Rag	$47.50	$43.90	$42.10
75% Rag	37.50	34.55	33.10
50% Rag	32.25	29.40	28.25
25% Rag	28.75	26.15	25.10

Sulphite Bonds and Ledgers—White, Assorted Items Bonds, per cwt.

No. 1	$19.25	$17.50	$17.00
No. 2	18.25	16.50	16.00
No. 4	17.50	16.00	15.25

Ledgers, per cwt.

No. 1	$20.25	$18.35	$17.60
No. 2	19.25	17.50	16.80
No. 4	18.50	16.90	16.10

Free Sheet Book Papers—White, Cased Paper

(Per cwt.)	Case	Ton
No. 1 Glossy Coated	$20.40	$19.55
No. 2 Glossy Coated	19.15	18.30
No. 3 Glossy Coated	18.40	17.60
(Per cwt.)	Case	Ton
No. 1 Antique (Watermarked)	$15.90	$15.15
No. 2 Offset	14.15 to 17.90	13.65 to 17.10
A Grade E. F.	14.90	14.25
B Grade S. & S. C.	15.40	14.65
B Grade E. F.	Nominal	
B Grade S. C.	Nominal	

Wood Pulp

Domestic mill prices delivered with former OPA freight allowances.

	Per Short ADT
Groundwood	$75.00 to $80.00
Unbleached Sulphite	115.00 " 125.00
Bleached Sulphite	121.00 " 125.00
Bleached Soda	115.00 " 120.00
Unbleached Kraft	112.50 " 125.00
Southern Kraft	112.50 " 125.00

Canadian Quotations

Prices delivered with freight allowances unless otherwise specified:

	Per Short ADT
Select Unbleached Kraft (no freight allowance)	115.00 " —
Unbleached Sulphite	115.00 " 117.00
Bleached Sulphite	125.00 " 155.00
Glassine Unbleached Sulphite (no freight allowance)	112.00 " —
Bleached Soda	105.00 " 115.00
Groundwood	70.00 " 85.00
Sideruns Pulping News	75.00 " 80.00
Hardwood and Specialty Grades	Nominal

Swedish Quotations
Ex. dock, New York

	Per Short ADT
Bleached Kraft	170.00 to 195.00
Bleached Sulphite	175.00 " 185.00
Unbleached Sulphite	145.00 " 165.00
Unbleached Kraft	140.00 " 155.00

Finnish Quotations
Ex. dock. New York

	Per Short ADT
Bleached Sulphite	$175.00 to —
Unbleached Sulphite	145.00 " 150.00
Unbleached Sulphate	140.00 " —

New Domestic Cotton Cuttings

(Prices delivered Mill Plus Dealer's Commission)

White Shirt	$11.50 to $12.00
Light Silesias	7.50
Unbleached Muslin	11.50 " 12.00
White Back Blue Overalls	8.50
Blue Overalls	7.75
Unbl. Fancy Shirt	5.00 " 5.50
Light Percales	6.00 " 6.50
Light Prints	5.25 " 5.95
Washables	4.00
Bleachable Khaki	6.00 " 6.50
Unbleachable Khaki	5.50 " 6.00
Cottonades	5.00 " 5.50

Old Domestic Cotton Rags

(F.O.B. Shipping Point Plus Dealer's Commission)

	Per 100 lbs.
No. 1 Whites Repacked	$4.50
No. 1 Whites Miscellaneous	4.25
No. 2 Whites Repacked	4.00
No. 2 Whites Miscellaneous	3.50
Blue Overalls	3.75
Thirds and Blues Repacked	3.00
Thirds and Blues Miscellaneous	2.50
No. 1 Roofing Rags	1.65
No. 2 Roofing Rags	1.55
No. 3 Jute Bagging	1.45
No. 4 Brussels and hard back carpets	1.45
No. 5A Roofing Rags	1.45

New Foreign Cotton Cuttings

(Prices delivered Mill)

	Per 100 lbs.
New Dark Cuttings	$6.00 to —
New Mixed Cuttings	6.50 " —
Light Silesias	9.00 " 10.00
Light Flannelettes	8.00 " 9.00
New White Cuttings	13.00 " 15.00
Fancy Shirt Cuttings	9.00 " 10.00
Light Prints	8.00 " 10.00
Bleachable Khaki, No. 1	7.00 " 7.50
Unbl. Khaki, No. 1	6.25 " 6.75

Old Foreign Rags

(F.O.B. New York)

	Per 100 lbs.
No. 1 White Linens	$14.00 to 16.00
No. 2 White Linens	12.00 " 13.00
No. 3 White Linens	8.00 " 9.00
No. 4 White Linens	8.00 " 9.00
No. 1 White Cottons	10.00 " 12.00
No. 2 White Cottons	8.00 " 9.00
No. 3 White Cottons	6.50 " 7.00
No. 4 White Cottons	5.00 " 5.50
Extra Light Prints	7.50 " 8.00
No. 1 New Light Prints	6.25 " 6.75
Med. Light Prints	5.25 " 5.75
Dutch Blue Cottons	5.25 " 5.50
Checks and Blues	4.00 " 4.25
Linsey Garments	3.00 " 3.75
Dark Cottons	2.50 " 3.00
Old Shopperies	2.50 " 3.00
New Shopperies	2.50 " 3.00

Bagging

(Prices to Mill, f.o.b. N. Y.)

	Per 100 lbs.
Foreign Gunny, No. 1	$4.75 to 5.00
Domestic Gunny, No. 1	4.25 " 4.50
Light Wool Tares	4.50 " 4.75
Heavy Wool Tares	4.75 " 5.00
Bright Bagging	4.25 " 4.50
Foreign Manila Rope	6.00 " 7.00
Domestic Manila Rope	5.75 " 6.50
Jute Strings	4.50 " 5.00
No. 1 Sisal Strings	5.50 " 6.00
Mixed Strings	1.75 " 2.50

Waste Paper

Prices to Mills
(Dollars Per Ton)
F.o.b. New York, Baled

No. 1 Hard White Envelope Cuts, one cut	155.00 to 165.00
No. 1 Hard White Envelope Cuts	145.00 " 155.00
No. 1 Hard White Shavings, unruled	145.00 " 155.00
No. 1 Hard White Shavings, ruled	110.00 " 130.00
Soft White Shavings, one cut	145.00 " 155.00
No. 1 Soft White Shavings	135.00 " 145.00
Soft White Shavings, Misc.	125.00 " 135.00
No. 1 Fly Leaf Shavings	55.00 " 60.00
No. 2 Fly Leaf Shavings	50.00 " 55.00
No. 1 Groundwood Fly Leaf Shavings	30.00 " 33.00
No. 2 Mixed Groundwood Fly Leaf Shavings	(nominal)
Mixed Colored Shavings	(nominal)
Mixed Groundwood Colored Shavings	(nominal)
Overissue Magazines	(nominal)
No. 1 Heavy Books & Magazines	30.00 " 32.00
Mixed Books	15.00 " 20.00
No. 1 White Ledger	85.00 " 90.00
New Manila Envelope Cuttings, one cut	100.00 " 110.00
New Manila Envelope Cuttings	65.00 " 75.00
Extra Manilas	25.00 " 30.00
Mixed Kraft, Env. & Bag Cuttings	75.00 " 85.00
Kraft Envelope Cuttings	120.00 " 130.00
Triple Sorted, No. 1 Brown Soft Kraft	65.00 " 75.00
New Kraft Corrugated Cuttings	90.00 " 100.00
No. 1 Assorted Old Kraft	55.00 " 60.00
New Jute Corrugated Cuttings	27.00 " —
Old 100% Kraft Corrugated Containers	45.00 " 50.00
No. 1 News	14.00 " 18.00
No. 1 Mixed Paper	15.00 " 17.00
Box Board Cuttings	16.00 " —
White Blank News	75.00 " 80.00
Overissue News	20.00 " 24.00
Old Corrugated	30.00 " 32.00
Mill Wrappers	22.00 " 25.00

Twines

All Prices Nominal
(F. o. b. Mill)
(Soft Fiber)

Coarse Polished—India	.26	to	.29
Fine Polished—Fine India	.31	"	.35
Unpolished—Paper Makers	.20	"	.26
Tube Rope	.22	"	.27½
Wrapping	.26	"	.33½
Cotton	.70	"	—
(Hard Fiber)			
Mex. Sisal	.21	"	.24
Manila	.33	"	—
(Hemp)			
Polished Hemp	.63	"	—

PHILADELPHIA

Domestic Rags (New)

(F.O.B. Eastern Shipping Point)

Shirt Cuttings—New White No. 1	.11	to	.12
New White No. 2	nominal		
Light Silesias	.07½	"	.08
Black Silesias, soft	.06½	"	.07
New Unbleached	.10½	"	.11¼
Washable Prints	.06½	"	.07
Washable No. 1	.05	"	.05½
Blue Overall	.07½	"	.08
Cottons—According to grades—			
Washable Shredding	.03½	"	.04
Fancy Percales	.06¾	"	.07¼
New Black Soft	nominal		
Khaki Cuttings—Unbleachable Cotton Cuttings	.06	"	.06½
Bleachable Cotton Cuttings	.07	"	.07½
Men's Corduroy	.05¾	"	.06
Ladies' Corduroy	.05	"	.05½
Cottonades	.05½	"	.06

Domestic Rags (Old)

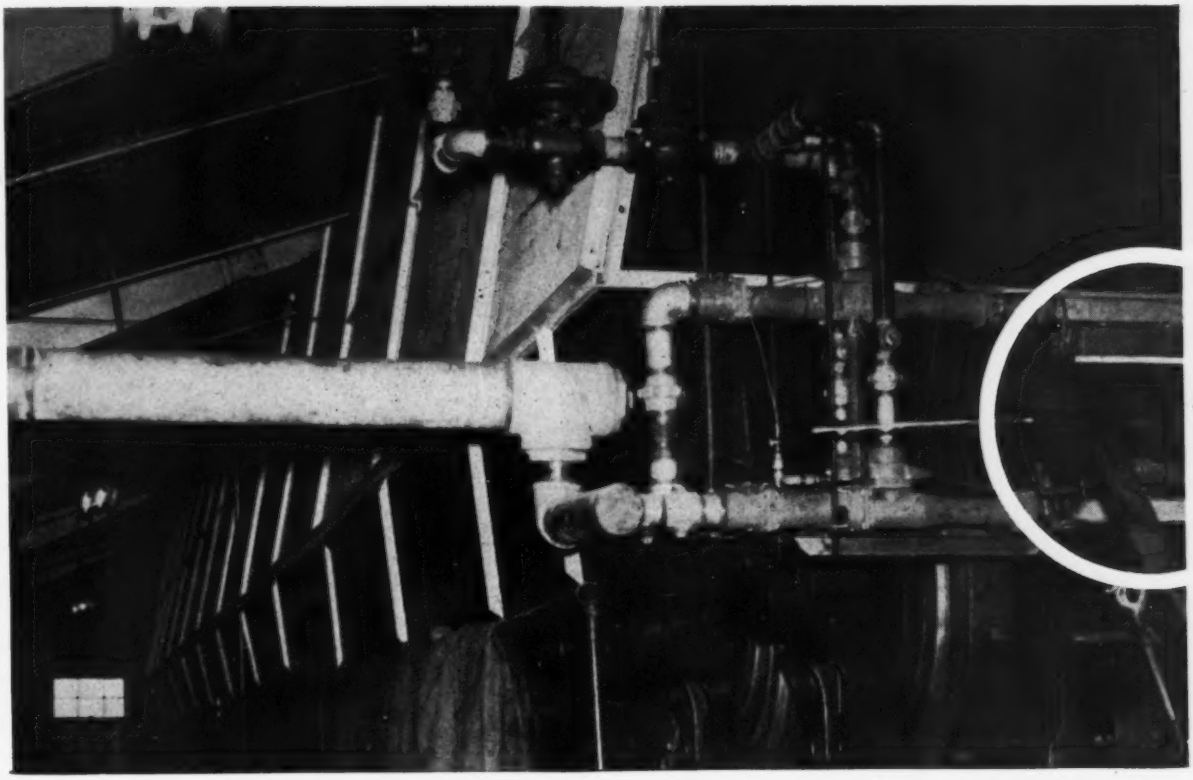
(F.O.B. Eastern Shipping Point)

White No. 1—Repacked	4.50	to	5.00
Mixed White	4.00	"	4.25
White No. 2—Repacked	3.50	"	3.75
Thirds and Blues—Miscellaneous	2.25	"	2.50
Repacked	2.75	"	3.00
Roofing Stock—Foreign No. 1	nominal		
Domestic No. 1	1.85	"	1.90
Domestic No. 2	1.75	"	1.80
Roofing Bagging	1.65	"	1.70
Old Manila Rope	6.50	"	6.50

Bagging

(F.O.B. Eastern Shipping Point)

Gunny No. 1—Foreign	nominal		
Domestic	4.50	to	5.00
No. 1 Clean Bright—Sisal Strings	.04	"	.04½
No. 2 Clean Bright—Sisal Strings	.03	"	.03¼
Sisal Jute	.02¾	"	.03
Scrap—No. 1	4.25	"	4.75
No. 2	1.75	"	2.00



Red-Ray Burners used on steam dryers increase drying speed on roofing felt.

RED-RAY

. . . . . Radiant Gas Burners

For The Paper Industry

Red-Ray Burners offer a practical, economical means for increasing drying capacity. Easily installed. No additional space required. Electrically controlled. Maximum flexibility.

Let an experienced Red-Ray engineer help you with your drying problems.

RED-RAY MANUFACTURING CO. Inc.
455 West 45th Street **New York 19, N. Y.**
Manufacturers of Radiant Combustion Equipment

Wool Tares, heavy	4.75	"	5.00
New Burlap Cuttings	6.00	"	6.50

Old Papers

(F. o. b. Phila.)
Mill Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	$100.00	to	$115.00
No. 1 Hard White Shavings, unruled	100.00	"	—
Soft White Shavings, one cut	90.00	"	95.00
White Blank News	70.00	"	75.00
Soft White Shavings	80.00	"	—
No. 1 White Ledger	80.00	"	85.00
Ledger, Colored	67.00	"	70.00
No. 1 Heavy Books & Magazines	30.00	"	32.00
Overissue Magazines	nominal		
New Manila Envelope Cuttings	80.00	"	—
No. 1 Assorted Old Kraft	60.00	"	65.00
No. 1 Mixed Paper	15.50	"	—
Box Board Cuttings	15.00	"	—
Kraft Corrugated Cuttings	90.00	"	100.00
Old Corrugated	30.00	"	35.00
Overissue News	30.00	"	—
No. 1 News	18.00	"	20.00

BOSTON

Old Papers

(F. o. b. Boston)
Mill Prices, Baled

No. 1 Hard White Shavings, unruled	7.00	to	8.00
No. 1 Hard White Shavings, ruled	7.00	"	8.00
Soft White Shavings, Misc.	6.25	"	6.50
No. 1 Fly Leaf Shavings	1.65	"	1.80
No. 2 Fly Leaf Shavings	2.00	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	1.25	"	1.50
Mixed Colored Shavings	2.50	"	2.75
New Manila Envelope Cuts, one cut	5.00	"	5.50
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	3.50	"	3.75
Mixed Kraft Env. & Bag Cuttings	3.75	"	4.00
Kraft Envelope Cuttings	3.75	"	4.00
No. 1 Heavy Books & Magazines	2.50	"	2.60
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White and Colored Tabulating Cards	4.25	"	4.50
Groundwood Tabulating Cards	1.35	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	3.50	"	—
No. 1 Mixed Paper	—	"	.95
Overissue News	1.50	"	1.75
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.50	"	—
Jute Corrugated Cuttings	1.07½	"	—
Paper Strings	2.25	"	2.50

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	—	to	4.75
Domestic	—	"	4.75
Sisal Rope No. 1	6.00	"	—
Sisal Rope No. 2	5.50	"	—
Mixed Rope	5.25	"	—
Mixed Strings	2.00	"	2.50
Transmission Rope—			
Foreign	(nominal)		
Domestic	3.00	"	3.50
Manila Rope—			
Foreign	(nominal)		
Domestic	6.25	"	—
Soft Jute Rope	5.00	"	5.25
Jute Carpet Threads	6.00	"	—
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	—	"	4.75
Domestic	—	"	4.87½
South America	5.25	"	—
Wool Tares—			
Foreign	4.75	"	—
Domestic	4.75	"	—
Aust. Wool Pouches	5.00	"	5.25
New Zealand Wool Pouches	5.25	"	5.50
New Burlap Cuttings	6.00	"	6.50
Heavy Baling Bagging	5.25	"	5.75
Paper Mill Bagging	3.50	"	3.75
No. 1 Roofing Bagging	1.75	"	—

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.08	to	—
Fancy Percales	.07½	"	.08
New White No. 1	.11	"	.11½
New Light Flannelettes	.08	"	.08½
Canton Flannels, Bleached	.10	"	.11
Underwear Cutters, Bleached	.10	"	.11
Underwear Cutters, Unbleached	.11	"	.12
Silesias No. 1	.08	"	.08½
New Black Silesias	.05	"	—
Red Cotton Cuttings	.05	"	—
Blue Overalls	.08½	"	.09
Soft Unbleached	.11	"	.12
Blue Cheviots	.08½	"	.09
Fancy	.06	"	—
Washable	.06	"	—
Khaki Cuttings	.06½	"	.07½
Corduroy	.03½	"	—
Khaki Canvas	.06¼	"	.06½
B. V. D. Cuttings	.10½	"	.11½

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.80	to	—
Miscellaneous	3.20	"	—
White No. 2—			
Miscellaneous	2.65	"	—
Twos and Blues, Repacked	2.20	"	—
Old Blue Overalls	2.25	"	2.50
Thirds and Blues,			
Repacked	2.20	"	—
Miscellaneous	1.80	"	—
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	2.00	"	—
No. 2	1.75	"	2.00
No. 3	1.35	"	—
No. 4	1.35	"	—
No. 5, Quality A	1.35	"	—
Quality B	1.20	"	—
Quality C	.95	"	—
Old Manila Rope	6.00	"	—

Foreign Rags

(F. o. b. Boston)

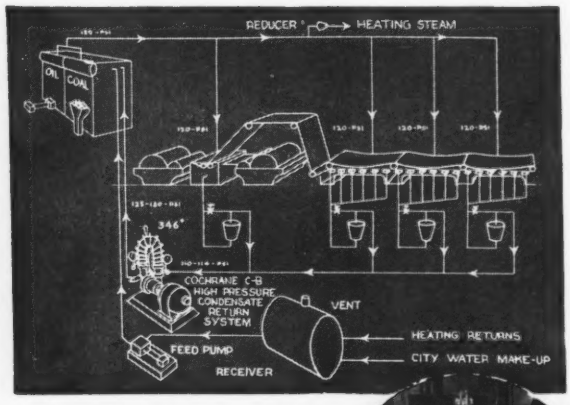
Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

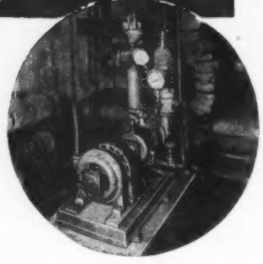
Waste Paper

(F. o. b. Chicago)
Mill Prices, Baled

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	$110.00	to	$120.00
No. 1 Hard White Shavings, unruled	105.00	"	115.00
No. 1 Soft White Shavings	80.00	"	95.00
No. 1 White Ledger	55.00	"	65.00
No. 1 Heavy Books & Magazines	40.00	"	43.00
White Blank News	65.00	"	—
Mixed Kraft Env. & Bag Cuttings	75.00	"	85.00
No. 1 Assorted Old Kraft	45.00	"	55.00
Overissue News	28.00	"	—
No. 1 News	18.00	"	20.00
No. 1 Mixed Paper	12.00	"	15.00
Old Corrugated	30.00	"	34.00
Mill Wrappers	22.00	"	—



In this typical paper box mill a Cochrane C-B High Pressure Condensate Return System removes condensate from corrugator rolls and combining plates at 110 to 114 psi with temperatures as high as 346°F. This uniformly high temperature permits faster operation, increased production less rejects and exceptional fuel savings. Production in this mill was increased 52%.



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Please send me a copy of your Publication No. 3250 and a list of paper companies using the C-B System.

Name .....

Title .....

Company .....

Address .....

City ..... Zone .... State .....

MARKETS

BLANC FIXE—Price boosts effective Oct. 1. Pulp is currently quoted at $77.50 per ton in barrels, car lots at works, and $82.50 l.c.l., f.o.b. works. Market steady, deliveries fair and supplies adequate.

BLEACHING POWDER—Market tightened. Demand firm. Shipments improved. Quotations are unchanged. Prices range from $3 to $3.75 per 100 pounds.

CASEIN—Current prices on processed acid precipitated casein remain at previous levels and are quoted around 31½ to 33 cents per pound for domestic grades and 32 cents for improved grades f.o.b.

CAUSTIC SODA—Priced upped Oct. 1. Demand exceeds production. Some improvement noted in shipments, market still tight. Solid caustic soda is reported at $2.85 per 100 pounds; flaked and ground offered at $2.25 to $3.25 per 100 pounds, car lots, at works.

CHINA CLAY—Market steady, domestic grades in good supply. Domestic filler clay is currently $9 to $11 per ton, car lots. Coating clay $15 to $30. Imported clay from $18 to $35 export warehouse.

CHLORINE—Demand continues strong. Market tight. Contract quotations hgher. Quantities unchanged. Chlorine is quoted at $2.25 to $3.75 per 100 pounds.

ROSIN — Persistent and heavy demand. Market strong. Production drop due to weather. Scarcity apparent. Prices boosted. Gum rosin in drums per 100 pounds net, in yard, New York, car lots, B, D, $8.25; E, $8.50; F, 8.50; G, $9.15; H, $9.15; I, $9.15; K, M, N, $9.65; WG, $9.75; WW, $9.85. Wood rosin, per 100 pounds net, f.o.b., l.c.l., N. Y., $6.45; FF, $7.95; G, H, I, K, M, $9.03; N, $9.09; WG, $9.45; WW, $8.87; X, $8.97.

SALT CAKE — Demand continues strong with slight improvement in shipments. Prices remain unchanged. Domestic salt cake is quoted at $20 to $26.

SODA ASH — Contract prices adjusted to higher levels. Expanding demand with no improvement in supply situation. Current prices, car lots, per 100 pounds, are as follows: in bulk, $1.10; in paper bags, $1.30; and in barrels, $1.80.

STARCH—Market steady. Active demand, export demand light. Pearl grade quoted at $6.57 per 100 pounds, powdered starch at $6.48 per 100 pounds, car lots, Chicago.

SULPHATE OF ALUMINA—Production insufficient. Buying tight. Prices firm. Quotations continue unchanged. The commercial grades are quoted at from $1.15 to $1.30 per 100 pounds, in bags, car lots, f.o.b. works. Iron free is quoted at $1.95 to $2.25 per 100 pounds in bags at works.

SULPHUR — Supplies ample to meet increasing demand. Annual contracts are quoted at $18 per long ton, f.o.b. mines; the price f.o.b. at Gulf Ports is $19.50 per long ton.

TALC—Domestic demand shows increasing strength with French grades steady. Domestic grades are currently quoted at from $16 to $30 per ton in mines; Canadian at $35 to $45 per ton. All prices in car lots.

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DIGESTED

For a business man to make up his own mind is *de rigueur*—and I'm confident that the Federal Government would support this view—but any association's function is to present the business man with facts, either directly or indirectly. Probably one of the most disturbing factors for producer, wholesaler and consumer is the lack of a stated policy with respect to selling or buying. Mill "A" does or does not "sell direct" or otherwise by-pass the paper merchant. Merchant "B" does or does not carry out the various functions of a wholesaler as expected by one or more of his suppliers.

Fortunately, these matters usually lend themselves to solution on a market basis. Therefore let each merchant and mill ask for and receive statements of policy as to what will be the rules of the game—such arrangements could be made reasonably binding. Certainly a stated unfavorable policy can do no more harm than an unstated one—except to those who seek to take unfair advantage—and let us hope for the day when an unstated policy will be widely considered tantamount to a statement of unfavorable policy.—W. G. LEATHERS, National Paper Trade Association, in the Paper and Twine Association Bulletin.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1947		Corresponding Weeks—1946	
August 30	104.1	August 31	105.6
September 6	84.7	September 7	86.7
September 13	106.9	September 14	105.1
September 20	108.6	September 21	105.8
September 27	107.0	September 28	106.6
October 4	*109.5*	October 5	107.2

COMPARATIVE MONTHLY SUMMARIES

1946		June	104.6	Dec.	97.0	Apr.	105.1
Jan.	94.7	July	94.0	Year Avg.	101.1	May	106.2
Feb.	98.4	Aug.	104.7	1947		June	106.0
Mar.	104.4	Sept.	101.3	Jan.	102.1	July	93.5
Apr.	102.7	Oct.	106.4	Feb.	105.9	Aug.	104.2
May	100.7	Nov.	105.5	Mar.	106.1	Sept.	*102.0*

COMPARATIVE YEARLY SUMMARIES

	1940	1941	1942	1943	1944	1945	1946	1947
Year to Date	86.2	95.4	92.0	88.2	88.0	88.4	100.6	*103.7*
Year Average	85.6	97.4	90.4	87.8	88.1	89.4	101.1	

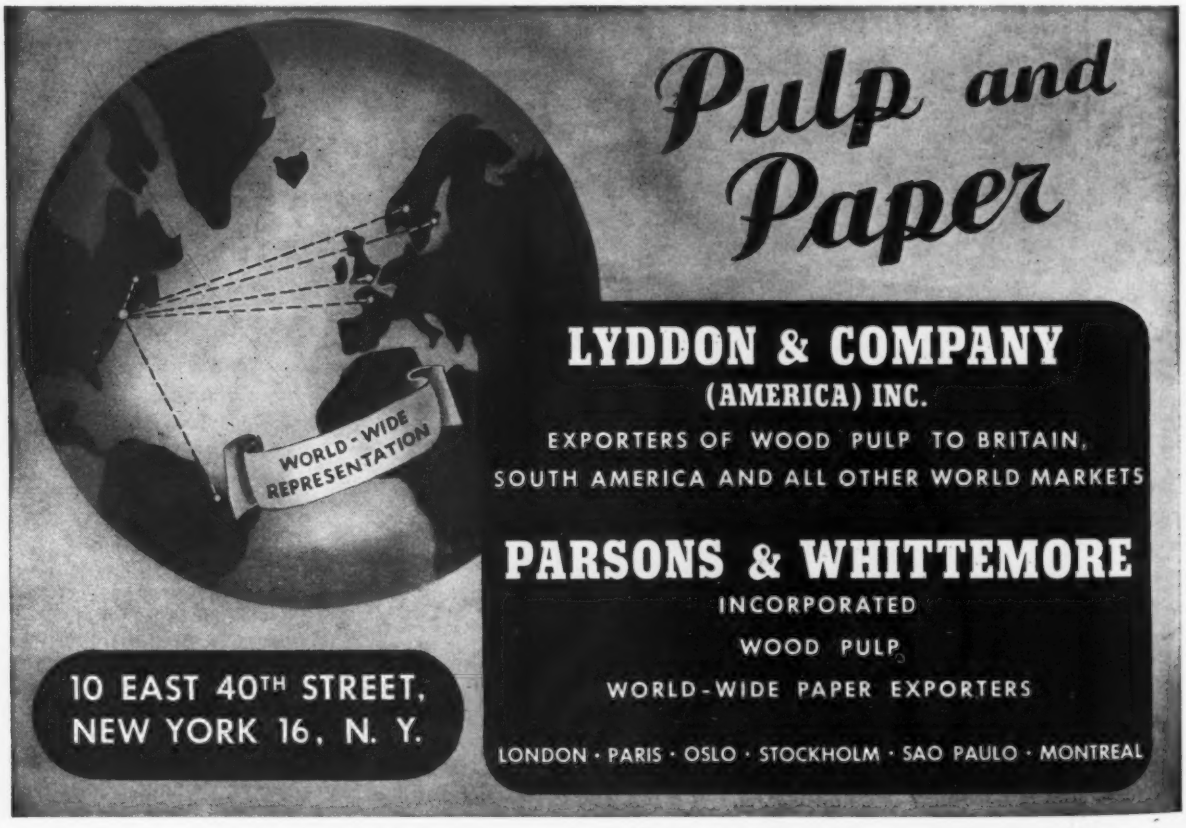
PAPERBOARD OPERATING RATIOS †

Current Weeks—1947		Corresponding Weeks—1946	
August 30	99	August 31	100
September 6	79	September 7	83
September 13	103	September 14	101
September 20	101	September 21	100
September 27	102	September 28	101
October 4	*100*	October 5	100

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1946	90	91	100	99	94	97	89	99	96	100	99	92	96
1947	99	103	101	100	101	101	90	99	*96*				

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.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EDITORIAL

Stream Pollution

In his discussion of the great steps that have been taken by industry in its attack on the problem of stream pollution, Russell Winget, Executive Secretary of the National Council for Stream Improvement recently showed that the growing acuteness of the problem is a result of national progress, rather than of national indifference. Population is increasing; its demands on industry are growing, and so are its requirements for more living space. All of which tends to crowd in on the use of the nation's brooks and rivers.

As to the direct activities of the pulp and paper industry he pointed out in a talk before a group of game and fisheries interests last month how for five years the Institute of Paper Chemistry has been working under subsidy of the Council, and now is operating an aquatic biology project at a cost of $10,000 yearly. At Oregon State College the Council investigated the possibility of producing fodder yeast from waste sulphite liquor. A plant to produce yeast from waste liquor is now under construction in the Middle West, and it seems that this process holds out some promise, research is continuing at Oregon State. At Rutgers University in New Jersey the council is conducting laboratory research to determine the feasibility of reducing oxygen demand of wastes by the foam phase treatment and in Michigan, in cooperation with the University of Michigan and Kalamazoo College, has just put into operation a large scale pilot plant to investigate the possibility of reducing the oxygen demand of waste liquors by aerobic decomposition.

They have attacked the problem of oxygen depletion in a new and novel manner in Wisconsin. Here, with the cooperation of the Wisconsin State Department of Health, they are experimenting with the artificial reoxygenation of rivers subject to pulp mill pollution. This process consists simply of diffusing very large quantities of air through diffusers installed in the bed of the river below the mill outfall. This restores the oxygen which may have been depleted by reaction to the mill wastes and we have had very encouraging results. Under certain specified conditions this process offers a simple solution to a difficult problem. Another device which has been employed in emergency problems is the retention lagoon. Originally lagoons were used to provide retention of wastes either permanently or during periods of low river flow. Recently, however, sanitary engineers have developed methods whereby, under certain conditions, with micro-biological methods, the pollutional effects of the stored wastes can be greatly reduced and in some cases eliminated. This method has been used with great success by a pulp and paper mill located on the Angelina River in Texas where extremely low summer flows presented a major problem.

"I think," Mr. Winget pointed out, "it must be obvious to all that our pollution problem is not going to be solved overnight. Ninety per cent of the 35 or more states in which there are large populations and/or heavy concentrations of industry have what are generally considered adequate stream pollution laws and the agencies enforcing these laws are doing a commendable job in consideration of the difficulties which they face. When Congress adjourned in July, it had pending a half dozen or so bills relating to stream pollution. A simple process of interdiction is not alone, however, going to be effective in this problem. The matter is not that simple.

Broad problems of equity must be considered, municipalities must raise funds to build treatment plants even though taxpayers are already uttering plaintive cries of distress as they scan their 1947 tax bills and despite the fact that in many states municipal budgets have reached the statutory limit provided by state laws. Methods and techniques for treating industrial wastes will, in many cases, have to be developed in the laboratory and then through a tedious process of pilot plant adaptation be made available for practical application. All this is going to take time. It is our business to know what other industries are doing about their pollution abatement problems and I know that most of the industries I have mentioned are carrying out comprehensive and well-planned abatement programs. I have told you in detail what the pulp, paper and paperboard industry is doing and I can assure you that this industry will meet its responsibilities.

Newsprint

Production in Canada during September 1947 amounted to 366,092 tons and shipments to 379,460 tons, according to R. S. Kellogg, secretary of the Bureau. Production in the United States was 70,732 tons and shipments were 70,168 tons. The output in Newfoundland was 33,343 tons and shipments were 32,292 tons making a total North American production of 470,-167 tons and shipments of 481,920 tons, compared with continental production of 420,574 tons and shipments of 422,509 tons in September 1946. North American production in September 1947 was greater than in any previous September on record.

Stocks of news print paper at the end of September were 67,564 tons at Canadian mills, 12,397 tons at United States mills, and 64,862 tons at Newfoundland mills, making a combined total of 144,823 tons compared with 156,576 tons on August 31, 1947, and 204,576 tons at the end of September 1946.

W. L. Cook **Editor**

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SECTION OF THE

TECHNICAL ASSOCIATION
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122 E. 42nd ST., NEW YORK 17, N. Y. *Edited By* R. G. MACDONALD, *Secretary*

Applications of Starch Viscosity to the Paper Industry*

By W. G. Bechtel[1] and C. C. Kesler[2]

Abstract

Starch cooked with water does not have true viscosity. Starch paste viscosity varies with rate of shear used in the test and with the previous treatment given the sample. For comparative starch viscosity tests identical instruments should be used, and the cooking procedure must be carefully standardized.

Of conventional viscometers, the orifice type has generally been used for all kinds of starches in the industrial range of concentrations. When any conventional viscometer is used, one serious problem is to avoid differences in conditions of cooking pastes. Another is that a single viscosity test does not give complete information about starch flow properties.

A new viscometer has been developed which makes a continuous, automatic record of starch viscosity during cooking and cooling. The starch is cooked in the viscometer, eliminating the necessity of transferring it for testing. Cooking conditions are controlled automatically, thus results are free from differences due to variations in method of preparing pastes.

Applications are given to the study of problems in paper making. The stirrer has four speeds so that the effect of rate of shear can be studied. Its use for studying different starch cooking conditions, for enzyme conversions and for determinations of cold paste viscosities, is described.

The paper industry uses annually more than 250,000,000 pounds of corn starch in sizing and finishing paper, and another 100,000,000 pounds as an adhesive in the manufacture of paperboard. To meet the varied requirements of this industry, from beater starch and tub and calender sizes to the various types of paper coatings, the corn wet milling industry markets a large number of products. These range from unmodified corn starch to acid modified thin boiling and oxidized starches, dextrins and british gums. In each series, products of various degrees of modification are manufactured. The kind of modification and its extent determine the use for which each product is suited, and the concentration range for its use.

It has always been a matter of vital concern to the corn wet milling industry to maintain factory controls and testing procedures to insure that each starch meets the highest standards of quality and uniformity required of the many products of the industry. As a matter of routine each production lot is given a number of rigid tests. Of all the tests the most important is the determination of viscosity of the starch cooked with water, for this test shows how the starch will flow when in the hands of the consumer. Because of its importance, the corn starch producers have devoted a great deal of time and effort to obtain the most satisfactory procedure and instrument for making the viscosity determination, and research to this end has been carried on for years.

Starch Viscosity

The problem of determining starch viscosity for industrial purposes has unusual difficulties. The paste formed by cooking starch in water contains suspended particles as well as colloidal and dissolved matter. Because of its nature it must be tested in approximately the concentration range in which it will be used. At such concentrations its pastes do not follow the theoretical laws of viscous flow but have anomalous viscosity which has been discussed by Hatschek *(1)* and others. That is, the viscosity is not constant at all rates of shear, but varies as a function of the rate of shear employed in the viscometer used for the test. For comparable results then, the same rate of shear must be employed in all tests. In practice this generally means that viscosity tests performed in more than one viscometer will not agree unless the viscometers are of identical type of construction and dimensions.

The viscosity of a colloidal system or a suspension, such as a starch paste, also depends on the previous treatment of the material. This means that every step in the preparation of the starch samples must be performed in a manner that can be accurately duplicated. For example, starch viscosity is influenced by the initial temperature of the water used and the final temperature to which the paste is cooked, the rate of heating it, the rate of stirring, the stirring motion, and the size and shape of the stirrer. Any variation in these conditions will change the observed viscosity. Similarly the viscosity changes with length of time

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 24-27, 1947.

[1] Research Fellow, Corn Industries Research Foundation, Penick & Ford Ltd., Inc., Cedar Rapids, Iowa.
[2] Director of Research, Penick & Ford Ltd., Inc., Cedar Rapids, Iowa.

of cooking. Starch suspensions when heated thicken rapidly above a certain temperature which depends on the kind of starch being tested. The viscosity then rises to a maximum and on further cooking the paste thins out more or less depending on the kind of starch and its method of preparation.

In addition, starch viscosity is sensitive to the hydrogen ion activity of the paste, and to the presence of impurities and added materials, including the ions present in hard water. Evaporation of water from the paste must be minimized so that no variation in viscosity will occur due to an increase in starch concentration during its preparation.

Viscometers

A large number of viscometers have been designed and many have been used for starch. Blinc and Samec *(2)* describe a number of these. It is sufficient here to classify them in five types, 1 capillary, 2 falling ball, 3 rotational, 4 orifice, and 5 continuous reading.

While any viscometer can be used for determinations on dilute starch pastes, a serious difficulty arises in the use of some types in the industrial range of concentrations. This is due to the structural viscosity present in all except the most dilute pastes. Where structure exists it is manifested by an increase in viscosity when the paste stands at rest at constant temperature, and by a continuous fall in viscosity for some time when the paste is stirred at constant rate. If a viscometer is unduly sensitive to structural viscosity, the viscosity test may lead to entirely erroneous conclusions in regard to the industrial applications of a starch.

Because of their sensitivity to structure the capillary and falling ball types of viscometer are not useful for industrial starch testing. This has been pointed out by Morgan and Vaughn *(3)*. Both types have been used for research and the Hoeppler falling ball viscometer has ben used by Komm and Martin *(4)* for the study of structural viscosity.

Rotational viscometers have a limited application in starch testing. They have proved valuable in testing mixtures of starch with other materials, and the Brookfield, MacMichael, and Stormer have all been used in testing paper coatings. When the last two are used for starch hot viscosity tests a difficulty arises because the water baths on the viscometers are not adequate to maintain a constant high temperature.

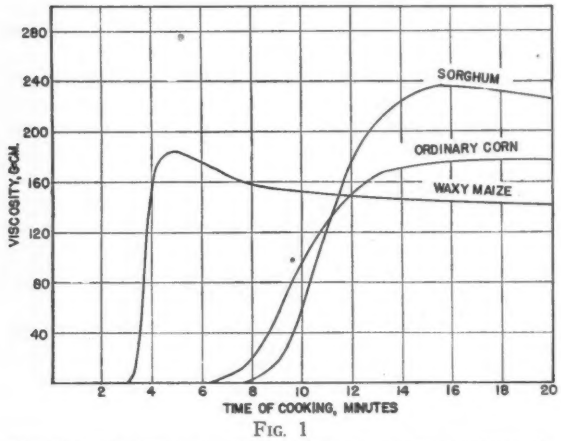

FIG. 1
Corn Industries Viscometer Curves of Starches at 5% Concentration Cooked to 195° F.

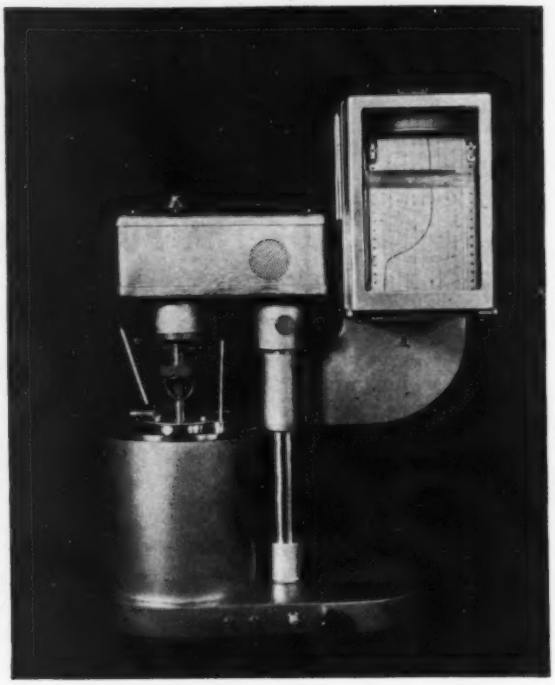

FIG. 2
Corn Industries Viscometer

When the hot starch paste is transferred to these viscometers a great deal of heat is lost to the suspended disk or rotor, and this causes a marked drop in paste temperature. However, the principal difficulty with rotational viscometers applied to the testing of starch pastes is their sensitivity to structure. When these viscometers are rotated in a paste of usual industrial concentration the reading does not remain constant, but slowly decreases over a period of several minutes because of the gradual breakdown of structure. This makes the test slow if it is continued until a constant reading is obtained.

Up to the present the method generally adopted in the starch industry has been to measure the rate of flow of a definite volume of paste through an orifice. Orifice viscometers include the Scott, Saybolt, pipets such as the Dudley, and various others developed by some of the starch companies. If such viscometers are used however, one must be sure that the hydrostatic head is sufficient to overcome the effect of structure. In other words a considerable depth of paste is required for good results. When the time that elapses between introduction of the sample into the viscometer and the start of the test is accurately standardized, such instruments are free from the objections that apply to some other types.

However, two problems still persist. One is that of cooking pastes in such a way that differences in technique will not alter the result. This is a real difficulty, as shown by reference to the list given above of factors which can alter the observed viscosity of starch. When cooking is done in a beaker with hand stirring it requires considerable experience before an operator can perform the test reliably. The difficulties are much greater if two or more operators are expected to duplicate results, for it is almost inevitable that differences in technique will occur.

The second problem is that a single determination of starch viscosity by any method made after a definite period of cooking does not give complete information about the characteristics of the paste. This is illustrated in Fig. 1, in which samples of waxy maize, corn, and sorghum starches, all at the same concentration, were tested in a continuous recording viscometer developed by the Corn Industries Research Foundation. A single viscosity test made under the conditions of the pastes after cooking about 11.5 minutes in this viscometer would indicate that these starches are nearly alike in their hot paste properties. Actually they differ widely in viscosity both before and after this time. As illustrated in Fig. 1, a single viscosity test may minimize differences between starches. It is equally possible that such tests will exaggerate the differences between others which may vary widely in the initial stages of cooking but which become similar in viscosity later.

Corn Industries Viscometer

For the reasons given above the Corn Industries Research Foundation established a fellowship for the study of starch paste characteristics and of viscometers especially suited for testing starch. This has led to the development of the Corn Industries Viscometer which has been described by Kesler and Bechtel *(5)*. Several of these instruments have been built for companies in the corn wet milling industry and for others with similar problems.

The viscometer is shown in Fig. 2. It was so designed that the starch is cooked in the viscometer to avoid the necessity of transferring the paste to a separate viscometer. This also permits a continuous determination of viscosity to be made and recorded automatically. The paste is stirred mechanically, and is cooked in a thermostatically controlled water bath. Thus the factors which may alter the viscosity such as rate of heating, final paste temperature and rate of stirring are automatically controlled so that from the time the starch-water slurry is added to the viscometer the test is independent of the operator. Evaporation of water from the paste during cooking is prevented by means of a condenser built in as a part of the tight fitting cover of the starch beaker.

The stirring device is of special design to keep the entire paste thoroughly agitated so that it is smooth and free from lumps, and to remove the layer of pasted starch from the walls of the beaker to obtain efficient heat transfer to the entire paste, insuring that it will be heated uniformly. Measurement of viscosity is obtained as the torque against a propeller which stirs the center of the paste. Its value is expressed in gram-centimeters. The stirrer is equipped with four speeds for the study of the effect of different rates of shear.

The test may be continued for any desired length of time at any temperature up to the boiling point of the paste, and cooling curves can be made as well.

Results of duplicate tests agree within narrow limits. Different varieties of starch and the many chemical modifications may be distinguished readily, as well as differences between production lots of the same starch. For these reasons the Corn Industries Viscometer can be used for both control testing and research.

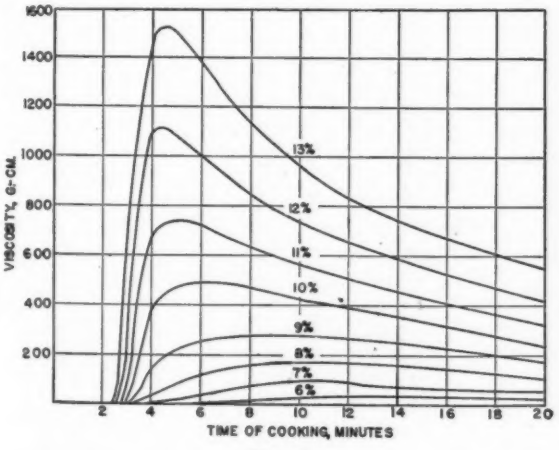

FIG. 3

Effect of Different Concentrations on the Viscosity of an Acid Modified Corn Starch Cooked to 195° F.

Applications to Paper

CONDITIONS OF COOKING STARCH

It is well known in the paper industry that the properties of a size or coating formula are influenced by the cooking temperature, cooking time, and pH. It will be noted that these are among the factors given previously as having an important effect on the starch viscosity test. The result of changes in these conditions can be studied in the Corn Industries Viscometer. Although rather extensive data have been secured with a number of starches, it will be sufficient for illustration to show the effect of changes in each of these conditions on one typical starch used in papermaking.

CHANGE OF CONCENTRATION

The effect of different concentrations on the viscosity of an acid modified starch is shown in Fig. 3.

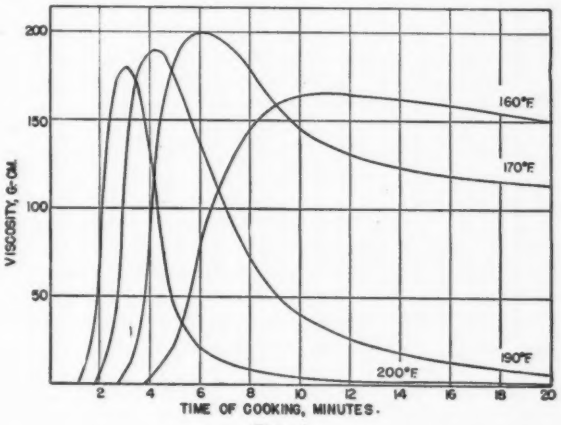

FIG. 4

Effect of Temperature of Cooking on the Viscosity of an Oxidized Corn Starch at 20% Concentration

From this figure it can be seen that as the concentration of starch is increased equal increments of starch concentration bring about increasingly large rises in viscosity. Thus when the starch concentration is 6% the viscosity after 20 minutes cooking is 27g.-cm., and at 7% it is 60 g.-cm., an increase of 33 g.-cm. Comparison of viscosities at 12 and 13% shows for the 20 minute viscosity 415 and 556 g.-cm. respectively, or an increase of 141.

This effect of increasing concentration is typical of all starches, and generally imposes a limitation on the amount of a given starch that can be used in any

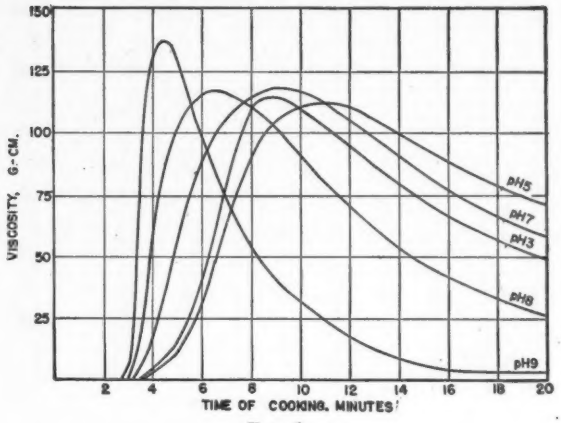

FIG. 5

Effect of pH on the Viscosity of 8% Pastes of Acid Modified Corn Starch Cooked to 195° F.

paper making process with the equipment in use. Too large a proportion of any starch will reduce the flow properties, and frequently near the upper limit of concentration a small increase in the amount of starch will cause an extraordinary viscosity rise. It is for this reason that manufacturers make starches of many degrees of modification. The more highly modified starches may be used in larger proportions while maintaining good flow characteristics.

Temperature of Cooking

The Corn Industries Viscometer is equipped with a variable thermostat so that pastes can be cooked to any desired temperature. By this means it has been possible to study the effect of the temperature to which a starch is cooked on its viscosity characteristics. For all starches it is observed that the higher the temperature to which they are cooked the more rapidly the paste thins out after going through the region of maximum viscosity. There is then a definite relationship between temperature of paste and the length of cooking required to give it the desired flow properties. This is shown in Fig. 4, for a highly oxidized corn starch of the type frequently used in paper coating. When this starch is heated to approximately 200° F. the paste thins out rapidly. When heated to 190° F. the paste also becomes suitably thin, but a longer time is required. If the starch is not cooked to a sufficiently high temperature to cause complete gelatinization then even long continued heating may not bring about the degree of thinning required for good flow characteristics. This appears from the curves of pastes heated to 170 and 160° F.

It should also be apparent that it is possible to overcook a starch and thus reduce the viscosity to too low a value so that good adhesive properties are lost. The temperature to which a starch should be cooked will depend on its variety, the degree and kind of modification, the purpose for which it is used, and the mechanical characteristics of the equipment in the mill, for starches are sensitive not only to heat but also to mechanical agitation.

Differences in pH

The effect of differences in pH can readily be studied in the Corn Industries Viscometer, with all other conditions of pasting maintained constant. It is found that variations in pH affect paste properties to an appreciable extent. While differences in pH alter the gelatinization range, as shown by the displacement of the rising portions of the curves in Fig. 5 which is of an acid modified starch, the part of importance to the paper industry is the effect on the extent of thining of the paste after the maximum viscosity. The extent of this effect depends on the natural variety of the starch and the degree and kind of modification. Unmodified corn starch is less altered by pH differences than are modified corn starches. Excessive acidity or alkalinity will result in a lowering of final viscosity as compared to that at the normal pH range of the starch and may result in some loss of adhesive properties. Commercial starches are adjusted to a pH value designed to be best for a specific application, but the addition of other materials to the mixture may cause a change in pH with resulting alteration in the starch characteristics.

Enzyme Conversions

In some mills starch is altered by enzymes to reduce the viscosity of the paste. Where this is done the problem is to control the conversion so that the viscosity of the starch is sufficiently reduced to have good flow characteristics at rather high concentration. If the starch is to be used for coating it is also important to prevent excessive gelling on cooling. At the same time it is necessary to avoid degrading the starch to an extent that reduces its adhesive properties unduly. That is, the conversion must be carried out between definite limits.

The extent of enzyme action depends on the starch and its concentration, the kind of enzyme used and its concentration, and on such factors as the temperature and time of conversion and the pH. One can study the effect of all of these factors in the Corn Industries Viscometer. Since the thermostat of the heating bath can be set at any temperature and the setting can be changed by the turn of a dial, it is convenient to convert samples in the viscometer and follow the changes in viscosity by means of the chart record obtained. The temperature and rate of heating in the large converter can be duplicated closely.

An illustration is given in Fig. 6. Here two commercial enzymes were used at the same concentration with the same corn starch and under the same conditions of pH, temperature, and time of conversion. The thermostat was set to convert the starch at 160 to 170° F. after which it was raised rapidly to 200° F. to inactivate the enzyme and cook the starch. Differences in the effectiveness of the two enzymes

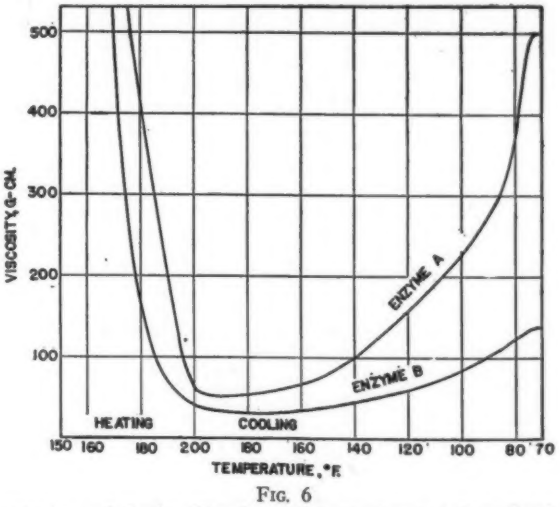

FIG. 6

Heating and Cooling Viscosity of Enzyme Converted Corn Starch at 20% Concentration

are shown early in the curve. In the case of enzyme B its increased effectiveness is first shown by the more rapid fall of hot paste viscosity after the maximum. Since coating mixtures are applied at a relatively low temperature the most important difference between the conversions is the extent to which the paste thickens or gels on cooling. Here there is a great difference, for the maximum cold viscosity of the paste converted by enzyme A is about 500 g.-cm. while that produced by enzyme B is only 143 g.-cm., or less than one-third as great.

By means of similar tests correlated with mill results, the best range of values of pH, temperature of conversion, and of enzyme concentration can be determined readily in the laboratory to endeavor to find the best conditions of use for any given coating application. It also seems entirely feasible to use the principle of this viscometer in actual plant control as well.

All types of starches have been used in the paper industry for various purposes. For sizing it is generally the hot paste characteristics which are of greatest importance, while for coating the properties of the relatively cool starch became of great concern. Coating formulas and equipment are of so many kinds that no general standards for cold paste characteristics of starch applicable to all mills, can be given. It is only possible to point out how studies of cold paste characteristics can be made.

Since enzyme conversions have already been discussed attention will be centered on an acid modified and an oxidized corn starch of high conversion and therefore of low hot viscosity. In Fig. 7 the cooking and cooling curves for these starches obtained by the Corn Industries Viscometer are shown. It is apparent that after the maximum viscosity is passed the oxidized starch produces a hot paste which is somewhat thinner than that of the other. The striking difference in their properties appears, however, when they are cooled. While the oxidized gum has a cold viscosity which levels off at 240 g.-cm. the acid modified starch thickens to about 575 g.-cm., or nearly 2½ times as much. Such studies can be of use to the coater to indicate the relative cold flowing properties of starches and their applicability to various coating conditions and formulas.

The use of a continuous recording viscometer such as the Corn Industries Viscometer avoids the difficulties encountered in attempting to determine starch flow properties with conventional viscometers. It permits studies to be made of the various factors which during the cooking of a paste alter the flow characteristics and adhesive properties. The study of cooling curves of various starches makes it possible, through correlation of the results with mill practice, to predict their applicability for various papermaking operations.

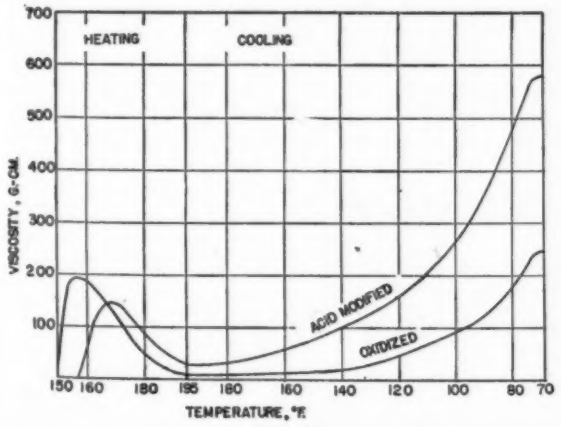

FIG. 7
Difference in Viscosity of Oxidized and Acid Modified Corn Starch at 24% Concentration during Heating and Cooling.

This research on starch is part of a program undertaken by the Corn Industries Research Foundation and published by their permission.

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5. Kesler, C. C., and Bechtel, W. G., *Analytical Chem.* 19, 16-21 (1947).

TAPPI Fibrous Agricultural Residues Meeting

S. I. Aronovsky, Chairman of the Fibrous Agricultural Residues Committee of the Technical Association of the Pulp and Paper Industry, has announced the following program of the convention.

Wednesday, October 22

8:00-10:00 p. m. — Registration; Hotel Mineral Springs, Alton, Illinois.

Thursday, October 23

8:00-9:00 a. m.—Registration, Conference Room Alton Box Board Company.

9:00 a. m. — Introduction, N. F. Wilson, Local Chairman of Meeting, Alton Box Board Company; "Welcome"—M. W. Swain, Vice President and General Manager, Alton Box Board Company; "TAPPI and the Board Industries"—W. F. Gillespie, President TAPPI; Technical Session—S. I. Aronovsky, Northern Regional Research Laboratory, presiding; (1) "Treatment for Prevention of Decay in Stocked Straw," B. Franklin Stahl, Terre Haute Paper Company, Terre Haute, Indiana, and Hillard L. Smith, Dow Chemical Company, Midland, Mich.; (2) "Meeting the Combine Harvester Problem in Straw Procurement for the Strawboard Industry," U. C. Wisman, Central Fibre Products Cobpany, Quincy, Ill.; (3) "Rapid Estimation of Moisture of Straw in Bales," S. I. Aronovsky and H. M. Sutcliffe, Northern Regional Research Laboratory, Peoria, Ill; (4) "Moisture Testing of Baled Straw by Electronic Methods," Norval F. Wilson, Alton Box Board Co.

12:00 Noon — Luncheon, Guests of Alton Box Board Company.

1:30 p. m.—(5) "The Stake of the Strawboard Industry in Rule 41," J. R. Little, Hinde and Dauche Paper Company, Sandusky, Ohio.

3:00 p. m.—Tour of Alton Box Board Company mill.

7:00 p. m.—Dinner—Alton Box Board Commissary, Guests of Alton Box Board Company.

Friday, October 24

9:00 a. m.—Meeting of Fibrous Agricultural Residues Committee: (a) Reports by Chairmen of Subcommittees; (b) Report on committee meetings of April 1 and May 28 held at the Northern Regional Research Laboratory, Peoria, Ill; (c) General discussion on projects; (d) Plans for the annual meeting.

12:00 Noon—Luncheon—to be arranged.

2:00 p. m.—Conducted tours: Owens-Illinois Glass Company, Alton, Ill.; Western Cartridge Company, East Alton, Ill.

Sulphate Pulping of Douglas Fir, Western Hemlock, Pacific Silver Fir, and Western Red Cedar Logging and Sawmill Waste*

By Mark W. Bray [1] and J. Stanley Martin[2]

Abstract

Pulping experiments were made at the Forest Products Laboratory to determine the suitability of logging and sawmill wastes from four major western species (Douglas fir, Western hemlock, Pacific silver fir, Western red cedar, and various mixtures of these) for the production of strong kraft and bleachable sulphate pulps. Although higher yields of kraft pulps, based on moisture-free weights, were obtained from Western hemlock and Pacific silver fir than from Douglas fir, the Douglas fir excelled all the others in yield per unit volume of wood. The lowest yield of kraft and bleachable sulphate pulps, on both a volume and weight basis, was obtained from Western red cedar, but both the kraft and bleachable sulphate pulps from this species excelled all others in several of the most important strength properties, with the exception of tearing strength. Because of these characteristics, proper blending of the fibers of Western red cedar with those from species that excel principally in tearing strength, such as Douglas fir, should be helpful in the production of pulps of balanced quality. In general, the results of the pulping experiments indicated that no difficulty should be experienced in cooking various mixtures of these four western species by the sulphate process and that logging and sawmill waste obtained from them is suitable for the production of good quality kraft and bleachable sulphate pulps.

Utilization of the vast quantities of cull material, woods waste, and sawmill waste has long been a challenge to progressive lumber manufacturers of the Northwest as well as to the U. S. Forest Service. A profitable utilization that pays the cost of removal of this material from the woods will at the same time promote improvements in forest management. Although unfit for lumber manufacture for various reasons, a large part of this waste material comes from perfectly sound trees and, therefore, should find profitable uses in various wood conversion industries. The pulp and paper industry offers a possible outlet for large quantities of these types of waste material.

The Forest Products Laboratory at Madison, Wisconsin, recently investigated the possibilities of these waste materials for the production of strong kraft and bleachable sulphate pulps for use in high-quality papers. The wastes consisted of several species including Douglas fir *(Pseudotsuga taxifolia)*, Western hemlock *(Tsuga heterophylla)*, Pacific silver fir *(Abies amabilis)*, and Western red cedar *(Thuja plicata)*.

Previous to this, the Laboratory had made rather extensive pulping trials on roundwood of Douglas fir *(1, 2, 3)* and Pacific silver fir *(4)* to determine the effects on yield and pulp quality both of the more important cooking variables and of certain structural characteristics due to the growth conditions of the tree. A limited amount of work had been done on the sulphate pulping of Western hemlock *(5)*, but only a small number of scout pulping trials had been made a number of years ago on Western red cedar *(5)*. The Laboratory had also studied the bleaching of Douglas fir *(6)* sulphate pulps by multistage bleaching methods and had produced experimentally several grades of papers from both the kraft and the bleached sulphate pulps.

For the present investigation, however, the Laboratory wished to extend the available information to logging and milling wastes representative of such material both as individual species and as it occurs in mixtures of species at sawmills. In general, a natural mixture of these species would consist of approximately 40% Douglas fir, 22.5% Western hemlock, 22.5% Pacific silver fir, and 15% Western red cedar.

Description of the Raw Material

The wood was shipped to the Laboratory from a western sawmill in the form of chips of the general size commonly used for sulphate pulping. Because of their relatively high moisture content (35 to 50%) when received, it was apparent they had lost little water in transit. In addition to the chips, transverse sections of a log of each species representative of the material available at that time at the sawmill were furnished for examination and measurement of density and certain growth characteristics.

Upon arrival at the Laboratory the chips of a given species were thoroughly mixed and run over the Laboratory chip screen. All material passing the 1¼- by 1¼-inch upper screen and remaining on the 5/16- by 5/16-inch lower screen of the chip screen was used for the pulping experiments. There was only a relatively small percentage of oversized pieces and fines which were rejected.

A representative sample of the chips of each species was taken for chemical analysis and, before the digester was charged, each batch of chips was sampled for its moisture content, so that chemical concentrations, liquor volumes, and pulp yields could be calculated on the moisture-free weight of wood charged.

The physical data obtained from the disks and

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 24-27, 1947.

[1] Chemist, Forest Products Laboratory,[3] Forest Service, U. S. Department of Agriculture.

[2] Engineer, Forest Products Laboratory,[3] Forest Service, U. S. Department of Agriculture.

[3] Maintained at Madison 5, Wis., in cooperation with the University of Wisconsin.

the chemical analyses of the chips are recorded in Table I in the order of decreasing density of the wood. The growth rate of the individual disks of Douglas fir varied from 18.9 to 35.6 rings per inch, average 25.8 rings per inch; Western hemlock from 10.1 to 14.7 rings per inch, average 11.7 rings per inch; Pacific silver fir from 8.1 to 10.0 rings per inch, average 8.8 rings per inch; and Western red cedar from 7.2 to 9.4 rings per inch; average 8.1 rings per inch. The Douglas fir was by far the slowest growth material of any of the species submitted and it also had the greatest density. The Western red cedar had the lowest density, which was noticeably reflected in the pulp yield per unit volume of wood. The heartwood content of the Western red cedar was highest, varying from 82 to 91% by volume, average 85%; that for the Douglas fir disks was second, varying from 78 to 84%, average 82%; then Pacific silver fir from 54 to 81%, average 66%; and finally Western hemlock, 33 to 72%, average 54%.

The four species varied considerably in chemical composition. These variations are noticeably reflected in yield and strength properties of the resulting pulps. For example, the low total and alpha-cellulose and the high lignin and extractives contents of Western red cedar presage the low pulp yields obtained on a weight basis. These chemical characteristics coupled with the low density of this wood resulted in abnormally low and probably uneconomical pulp yields on a cord or unit volume basis. In general, the analytical data obtained on the other three species are in line with average data previously obtained at the Laboratory on wood from various localities in Washington and Oregon. The chemical analysis did not indicate the presence of decay in any of the lots of chips, and except for the Western red cedar, there was nothing to indicate abnormal pulp yields.

A point of interest in regard to the chemical composition of a number of western conifers is their low pentosan content, 7 to 9%, in comparison with the spruces and pines of the East, and the yellow pines of the South, which have a pentosan content of from about 12 to 14%.

Sulphate Pulping Experiments

Two types of sulphate pulping procedures were used, one for the purpose of producing strong kraft pulps of higher yield and the other for the production of bleachable pulps of somewhat lower yield. For the kraft type of digestions all species were reduced under the same cooking conditions, which were so chosen from past experience as to be generally suitable for the production of this type of pulp both in high yield and with high strength properties. The conditions employed, while similar to those commonly used in kraft mill operations, differed in that dilution to the predetermined point was accomplished by the addition of water rather than sulphate spent or "black" liquor.

The bleachable sulphate digestions differed from the kraft-type digestions in that a higher ratio of chemical-to-wood and a higher concentration of chemicals in the cooking liquors were employed for the bleachable sulphate digestions than for the kraft-type digestions. Pulps with two degrees of softness, or bleachability, were made by increasing the time of digestion at maximum temperatures ¾ hour in one digestion over that of another.

Digestion Procedure

All digestions were made on the equivalent of 100 pounds of moisture-free chips in a 14-cubic foot steam-jacketed, tumbling-type digester heated indirectly with steam. A linear temperature-increase schedule was followed allowing 1¼ hours to bring the temperature of the digester from 30 to 150°C. and ½ hour from 150°C. to the maximum temperature (170°C.) where it was held for 1½ hours for the kraft digestions and for one type of the bleachable sulphate digestions and for 2¼ hours for the other type of bleachable sulphate digestions.

The sulphidity of the cooking liquors, when calculated on their active alkali content (NaOH + Na_2S calculated as Na_2O) was 30% for all the digestions.

The quantity of active chemicals (calculated as NaOH and Na_2S) charged per hundred pounds of moisture-free wood was 20 pounds (15.62 pounds of Na_2O) for the kraft digestions and 27.5 pounds (21.47 pounds of Na_2O) for the bleachable sulphate digestions. The total initial concentration of active alkali (NaOH and Na_2S) in the cooking liquors, including the moisture in the chips, was 50 grams per liter (equivalent to 39.05 grams per liter of Na_2O) for the kraft digestions and 60 grams per liter (equivalent to 46.85 grams per liter of Na_2O) for the bleachable sulphate digestions. Since indirect steam heating was employed, no further dilution occurred as a result of the cooking operation. The total volume of liquor charged, including the moisture in the chips per hundred pounds of moisture-free wood, was 48 gallons (6.42 cu. ft.) for the kraft digestion and 55 gallons (7.35 cu. ft.) for the bleachable sulphate digestions, making the liquor-wood ratios 4 to 1 and 4.6 to 1, respectively.

Upon completion of the cooking schedules, the pulps were blown at reduced pressure and washed with hot water, screened through an 8-cut (slot openings 0.008 inch width) flat screen, run over the Laboratory wet machine, where they were sampled for their moisture contents, and finally weighed for the determination of the yield.

All calculations of chemicals charged, liquor volumes, and pulp yields were based on the moisture-free weight of chips charged. Bleach consumption and the results of chemical analysis, on the contrary, are reported on the weight of moisture-free pulp tested.

The results obtained from the kraft pulping experiments together with similar data on some commercial pulps are reported in Table II and those for the production of bleachable sulphate pulps are reported in Table III.

Methods of Testing the Pulps

The freeness of the unbleached pulps was determined by the Schopper-Riegler method. The strength properties of the unbleached pulps were determined on test sheets prepared after processing in a 1½-pound standard beater according to TAPPI Standard .T200 m-40, which specified 6,500-gram weight on the bedplate lever for kraft pulps. The unbleached pulps were also chemically analyzed for cellulose, alpha-cellulose, lignin, and pentosan contents and for the chlorine consumption and permanganate number according to TAPPI standard procedures. The single-stage calcium hypochlorite bleach requirement test of the pulps was made by treating a 15-gram sample with 25% of its moisture-free weight of bleaching powder solution (equivalent to 8.75% chlorine) at 40°C. for such a time as was necessary to exhaust the chlorine. The brightness of the unbleached and bleached pulps was determined

with a Hunter reflectometer calibrated in accordance with TAPPI method T217 sm-42.

Results and Discussion of Pulping Experiments

Kraft-type Pulps

Yield of Kraft Pulps.—As shown in Table II, the yields of moisture-free kraft pulp for the four species, when compared on the weight basis, were about the same (ranging from 47 to 49%) for Douglas fir, Western hemlock, and Pacific silver fir, but, owing to the high lignin and extractives and the low cellulose contents of Western red cedar, the yield of moisture-free kraft pulp from this species was about 10% lower (39.5%, based on moisture-free wood). Although the percentage yield by weight of kraft pulp from Douglas fir is about 2% lower than those of Western hemlock and Pacific silver fir, the higher density of the Douglas fir wood more than compensates for the difference, and the net result is a slightly higher yield of pulp per cubic foot of solid wood. Since both the density of Western red cedar and the percentage yield of pulp by weight are considerably lower, the yield of kraft pulp per cubic foot of solid wood from this species is approximately 36% less than the average of the yields from the other species. Pulp pields per unit of digester space would, of course, vary in the same proportion. The economical utilization of Western red cedar by kraft pulping would appear questionable were it not for the excellent strength properties of the pulp. The yield of kraft pulp obtained from the 50-50 mixture of Western hemlock and Pacific silver fir chips was about the same as those obtained from pulping the two species separately.

Chemical Composition of the Kraft Pulps. — The chemical analytical data reported in Table II indicate that all the experimental kraft pulps were given approximately the same degree of cooking as the commercial kraft pulps made from Southern yellow pine, jack pine, and Scotch pine, but were probably not reduced to quite the same degree as the sample of commercial black spruce kraft.

Small differences in lignin, cellulose, and permanganate number, however, tend to indicate that Pacific silver fir reduced a little more readily under the conditions employed than the other three species. On the other hand, Western red cedar, because of its high extractives and high lignin contents, has a higher alkali requirement and, therefore, under equal cooking conditions, is reduced to pulps of higher bleach requirements than any of the other species. Brightness values of test sheets obtained from single-stage bleachability tests and the permanganate numbers indicate the same trend and show roughly the bleach requirements of the kraft pulps. As of the wood of

Footnotes to Table II

[1] All digestions were made in a 14-cubic foot, steam-jacketed, tumbling digester heated indirectly with steam. The cooking conditions other than those given are as follows:

Initial concentration of cooking chemicals including moisture in chips:	
Sodium hydroxide, grams per liter, calculated as NaOH	35.25
as Na_2O	27.32
Sodium sulphide, grams per liter, calculated as Na_2S	14.75
as Na_2O	11.73
Total chemicals, grams per liter, calculated as NaOH and Na_2S	50.00
as Na_2O	39.05
Chemicals added per 100 pounds of moisture-free wood:	
Sodium hydroxide, pounds, calculated as NaOH	14.10
as Na_2O	10.93
Sodium sulphide, pounds, calculated as Na_2S	5.90
as Na_2O	4.69
Total chemicals, pounds, calculated as NaOH and Na_2S	20.00
as Na_2O	15.62

Sulphidity (based on active alkali calculated as Na_2O) $\frac{Na_2S}{NaOH + Na_2S} = \frac{4.69}{15.62} = 30.0\%$, which is equivalent to a sulphidity of 25.5% for an assumed activity of 85%.

Weight of moisture-free wood charged, pounds	100.0
Volume of cooking liquor (including moisture in chips) per 100 pounds of moisture-free wood, gallons	48.0
Liquor-wood ratio	4:1
Maximum digestion temperature, °C.	170.0
Temperature increase period, hours	1¾
Duration at maximum temperature, hours	1½

[2] Pulps beaten in Valley beater with 6500 gram weight on the bedplate lever. Pulps tested at 75° F. and 50% relative humidity.
[3] Corrected to 55-pound ream.
[4] Measured with a Hunter reflectometer calibrated in accordance with TAPPI Method T 217 sm-42.
[5] For digestion 2685 only, the total volume of cooking liquor was 53 gallons, resulting in a total chemical concentration (NaOH + Na_2S) of 45.3 grams per liter, which is equal to 35.35 grams per liter of Na_2O. Strength and chemical analysis data were not made on this pulp.
[6] Permanganate number was determined on a shredded sample of air-dried water-leaf paper; all other permanganate tests made on moist pulp taken after screening and running over wet-machine.
[7] Swedish kraft pulp, dried sample.

TABLE I.—GROWTH CHARACTERISTICS, AND DENSITY, OF FOUR WESTERN SPECIES AND CHEMICAL ANALYSES OF SAWMILL AND WOODS WASTE [1]

Species Name	Wood: Shipment No.	Tests on Log Cross Sections: Diameter, in.	Age, yr.	Average Growth Rate, rings per inch	Density,[2] lb.	Heartwood: Diameter, in.	Heartwood: By Volume, %	Chemical Analysis of Chips: Cellulose: Total, %	Cellulose: Alpha, %	Lignin, %	Pentosans: Total, %	Pentosans: In Cellulose, %	Solubility in: Alcohol-Benzene, %	Solubility in: Ethyl Ether, %	Solubility in: 1 Per Cent NaOH, %	Solubility in: Hot Water, %	Ash, %
Douglas fir (*Pseudotsuga taxifolia*)	2098	21.3	257	25.8	26.6	19.2	81.5	57.8	43.8	28.8	6.9	4.9	4.5	1.8	13.7	4.7	0.1
Western hemlock (*Tsuga heterophilla*)	2127	15.4	184	11.7	25.4	11.4	53.6	58.2	40.7	31.2	8.1	9.6	3.9	1.3	11.7	4.2	0.4
Pacific silver fir (*Abies amabilis*)	2128	19.6	169	8.8	24.0	16.1	66.1	60.7	43.2	30.5	9.2	6.0	2.6	0.5	10.8	3.0	0.4
Western red cedar (*Thuga plicata*)	2132	24.5	205	8.1	19.1	22.7	84.8	48.7	38.0	31.8	9.0	6.9	14.1	2.5	21.0	11.0	0.3

[1] The waste material was received in the form of pulpwood chips.
[2] Moisture-free weight per cubic foot, green volume.

TABLE II.—SULPHATE PULPING OF DOUGLAS FIR, WESTERN HEMLOCK, PACIFIC SILVER FIR, AND WESTERN RED CEDAR SAWMILL AND WOODS WASTE FOR THE PRODUCTION OF KRAFT PULPS

Digestion No.	Wood: Species: Name	Wood: Species: Amount charged, %	Wood: Species: Moisture content, %	Cooking[1] and Yield Data: Chemicals Consumed: Black Liquor: Total NaO per ton of air-dry screened pulp, lb.	Ratio of combined to total alkali, %	Per 100 pounds moisture-free wood charged, lb.	Free alkali content (calculated as NaOH), g./l.	Total Solids: Density at 15° C., °B.	Total Solids: Per cent	Total Solids: Per ton air-dry screened pulp, lb.	Heat value per pound of moist.-free residue, b.t.u.	Yield of Pulp (moisture-free): Screened: Per cubic foot of solid wood, lb.	Per cent	Screenings, %	Total, %	Interpolated Test Beater Strength Data[2] on Unbleached Pulps (ream size 25 by 40 inches—500): Freeness (Schopper-Riegler), ml.	Time of treatment, min.	Bursting strength, pt. per lb. per rm.	Tearing resistance, g. per lb. per rm.	Tensile Strength: Per square inch, lb.	Tensile Strength: For inch width,[3] lb.	Density of test sheet, g. per cc.	Folding endurance, double folds	Stretch, %	Chemical Analysis of Unbleached Screened Pulps: Cellulose: Total (Cross & Bevan), %	Cellulose: Alpha-, %	Lignin, %	Total pentosans, %	Chlorine number (Roe)	Permanganate number	Single Stage Bleach Test: Standard bleach powder, %	Brightness,[4] %
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)

these Western species, the pentosan content of the several pulps was low. Furthermore, the pentosan contents were low in comparison with the values obtained for the commercial kraft pulp samples on which this constituent was determined.

Physical Properties of the Kraft Pulps. — The Schopper-Riegler freeness and the physical properties of the test sheets were obtained on the experimental and commercial kraft pulps after definite time intervals of processing in the test beater. Curves were prepared by plotting the physical properties and beating time against the freeness. The values given in Table II were interpolated from the curves at given freeness values.

Since the differences in the chemical composition of the experimental kraft pulps are small, any differences in their physical properties may likely be attributable to some physical or morphological characteristic of the fibers rather than to degree of cooking. This conjecture is based on past experience where the proportion of springwood and summerwood was determined on log cross sections. It was not possible to make this measurement on the chips submitted for tests in this work. Since springwood fibers are different from those of summerwood, *(2, 7, 8, 9)*, variations in the ratio of these two components in the chips furnished may account for some of the differences in the physical properties and quality of the pulps obtained from the experimental cooks. For instance, the diameter of the lumen and possibly the wall thickness of the springwood and summerwood fibers of the several species may account for some of the differences in the physical properties of the pulps. If, as in the tables, the four species are arranged in the order of their densities, it is interesting to note that several of the strength properties of the kraft pulps vary with the density of the wood. With the exception of tearing resistance, which behaves in the reverse order of the other physical properties, the strength properties of the pulps as well as the densities of the test sheets increase as the order of the densities of the woods decrease. Previous experiments *(2, 7, 8)*, on a number of species including Northern and Southern pines, Douglas fir, and others have shown the same trends in pulp properties with wood density. The effect is probably actually caused by variation in the springwood-summerwood ratio. The density of the wood of conifers has been observed to increase markedly with increase in the summerwood content *(10)*. Therefore, in the observed relationship between pulp strength and density, the density itself is probably a secondary factor.

The fact that, when compared at a given degree of beating, the pulps obtained from the low density Western red cedar excelled all others in bursting, tensile, and folding strengths and in sheet density as well, but were lower in tearing strength strongly suggests that the sample of this species either contained a preponderance of springwood fibers or that the summerwood fibers were thinner-walled than those of the other species.

Fiber measurements on Western red cedar *(11)* indicate that both the springwood and the summerwood fibers of this species have thinner walls than any of the other three species. It can be expected that thin-walled summerwood fibers would tend to behave like springwood fibers in their effect on pulp properties.

In comparing the experimental Western red cedar kraft pulp with the commercial Western red cedar sample (Table II, 9445-T) the experimental pulp may be seen to excel the commercial pulp in all the physical properties. In fact, the experimental Western red cedar kraft pulp, except for tearing resistance, compared favorably in strength with those of the commercial kraft pulps shown in Table II.

Western red cedar might be used to good advantage to improve the quality of kraft pulps from other Western species. For instance, it might be added to Douglas fir which is lacking in those qualities in which Western red cedar excels but possesses other properties, especially tearing strength, that are lacking in Western red cedar. It would seem, therefore, that proper blending of the fibers of these two species would have excellent possibilities for the production of a kraft product of balanced physical properties.

The experimental Douglas fir kraft pulp (Table II, cooks 2684-85) obtained from logging and mill-waste chips was about equal in strength properties to other experimental pulps of this species made previously *(2, 3)* from roundwood. The pulp, as mentioned previously, was characteristically high in tearing strength but mediocre in other physical properties. Nevertheless, its strength properties were about equal to those of the commercial sample of Southern kraft.

The experimental kraft pulps made from Western hemlock and Pacific silver fir and also that from the mixture of equal weights of these two species had better strength properties, excepting resistance to tear, than the Douglas fir kraft pulp. In these experiments most of the strength properties of the Pacific silver fir slightly exceeded those of the Western hemlock; only the tearing resistance was slightly lower. The experimental kraft pulps from both these species compared favorably in most respects with those made commercially from Southern yellow pine (sample 9057-T), the 80-20 mixture of Western hemlock and white fir (sample 8685-T) and the sample of dried Scandinavian kraft pulp (sample 7954-T). They were about equal in folding endur-

Footnotes to Table III

[1] All digestions were made in a 14-cubic foot, steam-jacketed, tumbling digester heated indirectly with steam. The cooking conditions other than those given are as follows:

Initial concentration of cooking chemicals including moisture in chips:	
Sodium hydroxide, calculated as NaOH, grams per liter	42.35
as Na_2O	32.82
Sodium sulphide, calculated as Na_2S, grams per liter	17.65
as Na_2O	14.03
Total chemicals, calculated as NaOH and Na_2S, grams per liter	60.00
as Na_2O	46.85
Chemicals added per 100 pounds of moisture-free wood:	
Sodium hydroxide, calculated as NaOH, pounds	19.40
as Na_2O	15.03
Sodium sulphide, calculated as Na_2S, pounds	8.10
as Na_2O	6.44
Total chemicals, calculated as NaOH and Na_2S, pounds	27.50
as Na_2O	21.47

Sulphidity (based on active alkali calculated Na_2O)

$$\frac{Na_2S}{NaOH + Na_2S} = \frac{6.44}{21.47} = 30\%$$, which is equivalent to a sulphidity of 25.5% for an assumed activity of 85%.

Weight of moisture-free wood charged, pounds	100.0
Volume of cooking liquor (including moisture in chips) per 100 pounds of moisture-free wood, U. S. gallons	55.0
Liquor-wood ratio	4.6:1
Maximum digestion temperature, °C.	170.0
Temperature increase period, hours	1¾

[2] Pulps beaten in Valley beater with 6500 grams weight on the bed-plate lever. Pulps tested at 75° F. and 50% relative humidity.

[3] Corrected to 55-pound ream.

[4] Measured with a Hunter reflectometer calibrated in accordance with TAPPI Method T 217 sm-42.

TABLE III.—SULPHATE PULPING OF DOUGLAS FIR, WESTERN HEMLOCK, PACIFIC SILVER FIR, AND WESTERN RED CEDAR SAWMILL AND WOODS WASTE FOR THE PRODUCTION OF BLEACHABLE PULPS

Digestion No.	Wood: Species: Name	Wood: Species: Amount charged, %	Wood: Species: Moisture content, %	Cooking[1] and Yield Data: Chemicals Consumed: Total Na_2O per ton of air-dry screened pulp, %	Chemicals Consumed: Ratio of combined to total alkali, %	Chemicals Consumed: Per 100 pounds moisture-free wood, lb.	Chemicals Consumed: Black Liquor: Free alkali content (calculated as NaOH), g./l.	Chemicals Consumed: Black Liquor: Density at 15° C., °B.	Chemicals Consumed: Black Liquor: Total Solids: Per cent	Chemicals Consumed: Black Liquor: Total Solids: Per ton air-dry screened pulp, lb.	Chemicals Consumed: Heat value per pound of moist.-free residue, B.t.u.	Chemicals Consumed: Duration at maximum temp. (170° C.), hr.	Yield of Pulp (moisture-free): Screened: Per cubic foot of solid wood, lb.	Yield of Pulp (moisture-free): Screened: Per cent	Yield of Pulp (moisture-free): Screened: Screenings, %	Yield of Pulp (moisture-free): Screened: Total, %	Interpolated Test Beater Strength Data[2] on Unbleached Pulps (ream size 25 by 40 inches—500): Freeness (Schopper-Riegler), ml.	Time of treatment, min.	Tensile Strength: Bursting strength, pt. per lb. per rm.	Tensile Strength: Tearing resistance, g. per lb. per rm.	Tensile Strength: Per square inch, lb.	Tensile Strength: Per inch width,[3] lb.	Tensile Strength: Density of test sheet, g. per cc.	Tensile Strength: Folding endurance, double folds	Tensile Strength: Stretch, %	Chemical Analysis of Unbleached Pulps: Cellulose: Total (Cross & Bevan), %	Chemical Analysis of Unbleached Pulps: Cellulose: Alpha-, %	Chemical Analysis of Unbleached Pulps: Lignin, %	Chemical Analysis of Unbleached Pulps: Total pentosans, %	Chemical Analysis of Unbleached Pulps: Chlorine number (Roe)	Chemical Analysis of Unbleached Pulps: Permanganate number	Single Stage Bleach Test: Standard bleach powder, %	Single Stage Bleach Test: Brightness,[4] %
2682	Douglas fir	100	33.7	860	76.7	21.1	12.0	11.6	16.3	3,250	6,840	1½	11.97	45.0	0.3	45.3	865	0	0.41	3.4	1,430	9.8	0.44	11	2.6	94.6	80.4	4.1	5.9	4.0	18.4	0	20.7
2683																	800	40	1.00	2.9	5,900	27.4	0.65	900	6.0							25	58.7
																	700	63	1.15	2.4	7,200	32.0	0.69	1,000	6.0								
																	550	84	1.26	2.2	8,200	34.0	0.72	1,100	5.7								
2703	Douglas fir	100	24.8	886	68.1	18.7	16.4	12.1	16.6	3,430	6,700	1½	11.60	43.6	0.3	43.9	875	0	0.35	2.6	1,223	9.4	0.40	11	2.0	95.6	80.0	2.9	5.4	3.3	17.4	0	22.0
																	800	32	0.96	2.7	6,000	27.5	0.63	1,400	2.8							25	63.4
																	700	46	1.12	2.4	7,500	33.0	0.68	1,600	3.2								
																	550	64	1.22	2.2	8,700	36.0	0.72	1,500	3.5								
2688	Douglas fir	100	33.7	964	69.7	19.2	15.6	12.5	17.2	3,875	6,445	2¼	10.66	40.1	0.1	40.2	875	0	0.31	2.4	880	8.9	0.40	4	1.2	96.0	81.2	1.6	5.4	3.0	15.2	0	21.6
																	800	29	0.85	2.5	5,400	25.5	0.64	500	3.2							25	75.6
																	700	44	0.97	2.1	6,700	30.5	0.68	600	3.6								
																	550	57	1.08	1.8	7,700	32.5	0.72	700	3.8								
2700	Douglas fir	100	33.4	983	71.6	19.7	14.6	12.2	16.6	3,820	6,555	2¼	10.45	39.3	0.1	39.4	860	0	0.35	2.7	1,349	9.5	0.43	4	1.7	96.6	83.0	1.6	5.3	2.2	12.4	0	23.8
																	800	24	0.86	2.9	5,000	25.0	0.59	600	3.0							25	76.2
																	700	42	0.99	2.4	5,900	28.7	0.65	800	4.2								
																	550	60	1.10	2.1	6,850	30.0	0.70	670	4.8								
2691	Wn. hemlock	100	46.8	923	64.9	18.1	18.2	12.3	16.6	3,515	6,510	1½	10.85	42.7	0.2	42.9	865	0	0.44	3.4	1,595	11.3	0.43	21	3.7	94.7	79.2	3.5	5.0	3.2	15.9	0	27.8
																	800	33	1.13	2.3	6,000	26.0	0.67	1,300	5.8							25	67.7
																	700	57	1.21	2.1	7,700	32.0	0.72	1,400	5.9								
																	550	79	1.33	1.8	9,300	35.5	0.77	1,350	5.9								
2693	Pacific silver fir	100	52.0	876	70.4	19.4	15.2	9.9	13.5	2,710	7,360	1½	10.59	44.1	0.1	44.2	835	0	0.43	3.4	1,768	12.0	0.45	34	2.0	95.0	78.5	2.7	6.5	3.2	16.0	0	28.6
																	800	26	0.80	2.3	5,600	27.5	0.63	900	3.5							25	63.9
																	700	47	1.10	1.8	7,100	32.0	0.71	950	4.9								
																	550	64	1.17	1.6	8,550	35.0	0.79	1,150	5.4								
2695	Wn. hemlock	50	45.0	...	66.5	18.3	17.2	12.1	16.2	....	6,760	1½	....	...	..	...	850	0	0.42	3.5	1,648	11.7	0.43	24	2.0	95.1	78.3	3.6	5.9	2.8	16.5	0	26.3
	Silver fir	50	47.0	...	...	...	...	...	...	....	....	...	....	...	..	...	800	24	1.07	2.3	5,650	28.0	0.63	800	3.2							25	69.0
																	700	43	1.18	1.9	7,450	32.2	0.69	900	4.0								
																	550	58	1.27	1.7	9,000	37.5	0.74	1,050	4.3								
2697	Wn. hemlock	50	40.2	910	68.7	18.9	16.1	11.7	16.2	3,425	6,785	2¼	10.50	42.5	0.1	42.6	835	0	0.46	3.6	1,610	11.4	0.43	19	2.0	95.7	81.3	2.6	5.6	2.0	14.4	0	26.6
	Silver fir	50	42.8	...	...	...	...	...	...	....	....	...	....	...	..	...	800	24	1.03	2.4	5,700	27.0	0.64	1,300	3.4							25	71.6
																	700	45	1.28	2.1	7,550	32.7	0.72	1,450	3.9								
																	550	64	1.31	1.9	8,850	35.4	0.74	1,460	4.1								
2698	Wn. red cedar	100	44.0	1000	69.3	19.1	15.8	12.5	17.5	4,090	6,940	1½	7.38	38.6	0.1	38.7	835	0	0.85	2.6	4,513	23.8	0.58	1,075	4.0	95.1	82.2	3.5	8.1	3.1	18.2	0	23.3
																	800	20	1.46	1.8	8,230	34.0	0.74	1,670	4.0							25	65.9
																	700	53	1.55	1.6	11,000	42.0	0.82	1,850	4.2								
																	550	75	1.52	1.4	12,400	44.0	0.87	2,000	5.0								
2699	Wn. red cedar	100	43.2	1097	65.8	18.1	17.6	12.8	17.3	4,450	6,805	2¼	6.73	35.2	0.1	35.3	805	0	0.94	2.6	4,290	22.6	0.58	1,740	3.0	96.0	76.0	2.1	8.1	2.7	13.8	0	27.1
																	800	8	1.13	2.2	6,500	27.0	0.69	1,600	3.2							25	76.0
																	700	46	1.52	1.6	10,200	38.0	0.81	1,350	4.2								
																	550	70	1.55	1.4	11,800	42.0	0.87	1,500	5.0								
2701	Douglas fir	50	22.2	...	...	...	...	...	...	....	....	...	....	...	..	...	840	0	0.36	3.1	1,285	10.1	0.39	7	1.3	95.4	80.9	2.6	5.5	2.3	16.0	0	24.0
	Wn. hemlock	25	45.9	873	68.5	18.8	16.2	12.0	16.6	3,380	6,800	1½	11.34	44.2	0.2	44.4	800	28	0.94	2.8	5,500	27.2	0.62	1,000	4.4							25	67.4
	Silver fir	25	...	...	...	...	...	...	...	....	....	...	....	...	..	...	700	51	1.15	2.5	7,300	33.0	0.66	1,500	4.5								
																	550	72	1.27	2.3	8,400	36.0	0.71	1,500	4.6								
2702	Douglas fir	40.0	22.2	...	...	...	...	...	...	....	....	...	....	...	..	...	850	0	0.39	3.3	1,525	11.2	0.41	28	1.0	95.7	81.0	2.6	6.0	2.6	15.7	0	24.0
	Wn. hemlock	22.5	44.2	916	66.8	18.2	17.4	12.3	15.3	3,270	6,770	1½	10.40	42.2	0.2	42.4	800	32	1.09	2.7	5,400	26.5	0.63	1,200	3.2							25	68.9
	Silver fir	22.5	44.2	...	...	...	...	...	...	....	....	...	....	...	..	...	700	55	1.24	2.1	6,500	29.5	0.67	1,100	4.0								
	Wn. red cedar	15.0	55.9	...	...	...	...	...	...	....	....	...	....	...	..	...	550	80	1.26	1.9	7,800	34.0	0.72	1,000	4.5								

ance, and somewhat better in tearing strength than the commercial kraft pulps from Northern jack pine and black spruce (samples 8981-T and 9312-T, respectively).

Bleachable Sulphate Pulps

The data on bleachable sulphate pulps are reported in Table III. Results are shown for pulping experiments on the four individual species and for several mixtures. The experiments on the single species not only indicate their individual behavior, but the pulp properties show their contribution to the physical properties of pulps made from mixtures.

Yield of Bleachable Sulphate Pulps.—As a result of pulping with a liquor of higher chemical content (21.47% Na_2O) than that used for the kraft digestions (15.62% Na_2O), the pulp yields were decreased by about 4 or 5%, except for Western red cedar, which was only 1% lower. The small difference for Western red cedar may be attributed to the high content of extractives of this species. These react readily with the cooking chemicals and possibly account largely for the lower yield compared to the other species. The additional chemicals used in the bleachable pulp digestions, being available for reaction with the most resistant wood constituents were only slightly more effective in lowering the yield. Increasing the time of digestion at maximum temperature (170° C.) from 1½ to 2¼ hours resulted in a further decrease of about 3 to 4% in the yield of moisture-free pulp from each species without much change in the percentage of screenings (0.2% at most).

Chemical Composition of Bleachable Sulphate Pulps.—The chemical compositions of the bleachable sulphate pulps (Table III) compared with those of the kraft pulps (Table II) indicate that a considerable improvement in purity (higher cellulose and lower lignin contents and lower bleach requirements) resulted from the more drastic digestion conditions. The pentosan contents of the bleachable pulps were only slightly lower than those of the kraft pulps. The Western red cedar pulps had a higher pentosan content than any of those from the other three species.

The bleachable pulps prepared by the longer cooking schedule are also of noticeably higher purity and have lower bleach requirement than those cooked for the shorter period. The total cellulose contents of the pulps cooked by the shorter schedule averaged 95.1% for all species and those for the longer period averaged 96.1%. The average of the lignin contents of the pulps was decreased from 3.2 to 2.0% and that of the permanganate numbers from 16.8 to 14.0% by the longer cooking schedule.

As was pointed out in discussing the physical properties of the kraft pulps, certain of the strength properties of the bleachable sulphate pulps also can, to some extent, be correlated with the density of the wood. For example, tearing strength decreased with decrease in the order of the density of the four species and Western red cedar having the lowest wood density produced pulps having the highest bursting, tensile, and folding strengths. However, under the more drastic cooking conditions employed for making the bleachable pulps, the physical properties of the pulps become more difficult to correlate with any property of the wood itself.

An increase in the time of digestion at maximum temperature (cf digestions 2703 and 2700, Table III) caused a decrease in practically all the strength properties of the pulps from Douglas fir, but showed very little difference in the pulps from Western red cedar (cf digestions 2698 and 2699) and the 50-50 mixture of Western hemlock and Pacific silver fir (cf digestions 2695 and 2697). The change in the cooking conditions, however, caused a noticeable decrease in the bleach requirements of the pulps from all the species as evidenced by the lower permanganate numbers and the higher brightness values of the pulps bleached by the single-stage hypochlorite test method.

Conclusions

The experimental data obtained from the pulping of Douglas fir, Western hemlock, Pacific silver fir, and Western red cedar show that these four species can be cooked together without difficulty by the sulphate process and that logging and sawmill waste is suitable for the production of kraft and bleachable sulphate pulps of good quality. The kraft pulps obtained from all four species were at least the equal in strength to the sample of Southern commercial kraft tested, with the possible exception of the low tensile strength of the Douglas fir kraft. The kraft pulps made from Western hemlock and Pacific silver fir were superior in tearing strength and equal in other strength properties to that of a commercial kraft pulp made from a mixture of 80% Western hemlock and 20% white fir. However, they were lower in bursting and tensile strengths, about equal in folding endurance, and higher in tearing resistance than commercial Northern kraft pulps made from jack pine and black spruce. Except for tearing resistance, the experimental Western red cedar kraft pulp was superior to any of the commercial Northern, Southern, or Western kraft pulps tested. Confirming previous findings on Douglas fir, the kraft pulp made from this species was higher in tearing resistance but lower in most other strength properties than any of the commercial pulps listed.

The bleachable pulps retained considerable strength even though they were produced with a higher percentage of chemical. Again the bleachable sulphate pulp from Western red cedar excelled those made from the other three species in all strength properties, except tearing resistance. As would be expected, the longer cooking schedule reduced the strength properties of the bleachable sulphate pulps, but not to such a degree as to render this method unfeasible should ultimate savings in bleach consumption and strength retained by fully bleached pulps warrant such a procedure. The strength characteristics of Western red cedar and Douglas fir pulps suggest that proper blending of the fibers of these species should have excellent possibilities for the production of a kraft product of balanced physical properties.

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